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VOL. CLXIX., No. 3219.] WEDNESDAY, JANUARY 21, 1925. [77TH YEAR.

THE RETURN TO WEMBLEY.

The Gas Industry Recommended to be There.

LIGHTER and brighter is the British Empire Exhibition to be from its Spring to Autumn run this year. The Authorities, profiting by their experience of last year, are going to popularize the display to the utmost of their power. It is to be an Empire Exhibition soul and body, and no exotic goods will be allowed entrance. It will be in many respects different from the exhibition of last year—in other words, the details of its filling will be changed—especially in what we have known as the Palace of Engineering. Much of the space then occupied by heavy machinery and other manufactures will be devoted to exhibits more in accord with popular taste and appreciation. For example, one project is a great housing exhibit, in which the Minister of Health (Mr. Neville Chamberlain) is keenly interested. This, if nothing hinders consummation, will draw countless numbers of the building trades and of the architectural profession from all parts of the country. The gas industry must be there. It is hoped, too, that there will materialize a large railway transport section, this being the centenary year of steam transport in this country. If this feature develops, railway people from all over the country will be attracted; and we may be sure that the railway companies will make their presence at the exhibition a good reason for rendering the maximum service in conveying people to it from all quarters of the country. The grounds also will look vastly different from what they did last year, when their laying-out had not been completed at the time of the opening of the Exhibition, and the roadways were not compatible with the comfort of the visitors. The grounds are being beautified, the road surfaces improved, and the lighting of the grounds is undergoing necessary extensive revision. There is to be more music; a new programme of attractions is being designed for the Stadium; and the world is being ransacked for further novelties for the Amusements Park. The 17 millions of people who visited Wembley last year did not—numerically viewed—please the authorities. They are minded to get many more there this year by popularizing the great display. That in itself will be a big advertisement; but, in addition, there is to be an allocation of funds sufficient properly to advertise the Exhibition throughout the length and breadth of the land. The problem of catering, too, is being thoroughly investigated. All these are matters which are important to exhibitors, whose main concern is that the people shall be drawn to Wembley in comfortable magnitude from day to day. In considering their plans the authorities are concentrating largely on this essential to a real success.

The gas industry is stronger to-day in its publicity work than it has ever been. Compare its enterprise of last year—an expenditure of £75,000 on a gas exhibit, on publicity, and on interesting in the affairs of the industry influential professional men and the Press—with the miserable policy that obtained (say) twenty years ago. The enterprise last year was excellent, as was the result. A new commercial policy has indeed taken possession of the industry—to its lasting advantage. But the electrical manufacturers in the Palace of Engineering and elsewhere in the Exhibition spent last year approximately a million of money. Perhaps they would have felt in better mood this year in respect of further expenditure had their outlay been somewhat less lavish in a single one. The definite popularizing of the Exhibition this year is perhaps of greater importance to the gas industry than to its electrical competitors. The gas industry caters for all classes; and as statistics show, particularly for the masses as represented by the middle classes, craftsmen and other workers who constitute an enormous proportion of our population. When we learn from Sir Lawrence Weaver, Director of the United Kingdom Exhibits, and from Sir Travers Clarke, the Chief Administrator, of what is being done to popularize the Exhibition this year, there is no escaping the conclusion that the gas industry must be there, making the good impression created by its display last year deeper, broader, and still more permanent. Thus it is that we heartily welcome the information that at a joint meeting last week of the British Empire Gas Exhibit Committee and of the Central Executive Board of the National Gas Council, it was resolved to recommend to the gas industry that steps should be taken to ensure that gas shall again be represented by a co-operative display in the home which the industry built for itself a twelve-month ago—right in the heart of the Palace of Industry. That is its natural and rightful place, in view of the ramifications of its products in the domestic and industrial work of the country. In occupying for its exhibit the same position and building, the industry will be in a very live part of the general exhibition. Already the authorities are assured that the Palace will be filled with high-class industries and popular exhibits. The chemical people have decided to take at any rate 80 p.ct. of their old space; Ulster has staked-out twice her former space; food and confectionery will again be represented; the music exhibitors have decided to return; and the textile industry is moving with keen interest. One interesting feature is that some of the exhibitors are applying for an increased superficial area; and others who could not be admitted last year, through the exhaustion of space, are among the earlier applicants this year. In certain sections, too, in which there was individual display last year, there is to be co-operative exhibiting this. The co-operative plan is making distinct headway among business men, owing to the more effective work that can be accomplished.

The recommendation of the Gas Exhibit Committee and of the Central Executive Board of the National Gas Council to accentuate the effects of last year's display by re-opening with a new scheme will require the financial support of the industry. The cost will naturally be less than last year. The main structure will be available for use; and the rent of the space will be materially less. It was resolved at the joint meeting that gas undertakings should be asked to subscribe one-half the amount they contributed to the 1924 exhibit, or 3s. per million c.ft. of gas made, whichever would be the larger sum. The Gas Light and Coke Company have undertaken to subscribe £5000: and there have been definite promises of support as far apart as Cornwall and Yorkshire. It is remarkable how the influence of last year's exhibit was, and is being, felt

in the most distant places. Since the 1924 Exhibition closed its gates, we have heard of several instances in far-away places where the gas undertakings have obtained new business through what was observed at Wembley. Seeing something there in new surroundings and circumstances had an influence which viewing it at home under ordinary conditions might not have had. There was wide enthusiasm in the industry over the promotion of the exhibit last year, although all gas undertakings did not subscribe to the funds. No less than 80·33 p.ct. of the total sum was supplied by gas undertakings (including concerns operating in our Dominions); 15·23 p.ct. by the members of the Society of British Gas Industries; and the balance by the National Gas Council, the National Benzole Company, and the Sulphate of Ammonia Federation. We hope to see that enthusiasm not only repeated but intensified on this occasion; for where the public are going to be drawn together again in their millions, there the gas industry must be. And its representation there must again be the centre or the "peg" for propaganda work and broadcast advertising. Last year some 52 p.ct. of the money expended went in these latter directions; and it was money well spent. That is the opinion of the Gas Exhibit Executive Committee, and it has been wholly endorsed by the General Committee, as it was by the gas industry itself through our columns some months ago. An interesting point has been noted by Mr. F. W. Goodenough, the Chairman of the Executive, in making an analysis of last year's finance and inquiries. It is that, whereas £40,000 was subscribed by gas undertakings in the provinces, and £20,000 by gas undertakings in and about London, representing 2 to 1, the inquiries respectively represent 3 to 1. The interest of the provinces in the Exhibition last year is largely confirmed by the railway companies, who state that the passenger traffic was proportionately greater from them than from the suburbs of London. However, our own observations assure us that, if the gas industry had only reaped from its exhibit last year advantage to half the extent that it did, it would have been well worth all it cost, apart from the valuable service rendered by various voluntary hard workers in the industry.

The outline of a scheme for the Gas Exhibit this year has already been provisionally prepared. If it can be carried out, it will altogether change the features of the display last year. The Seven Ages of Woman will be displaced by scenes portraying the uses of gas in other countries of the Empire, and so illustrate how gas has penetrated into daily service in our Dominions and Dependencies. That will be a novel attraction in the midst of the demonstrations of home applications. But in view of the plans of the Authorities to popularize the Exhibition, and the strong belief there is that the middle and artisan classes will be largely in evidence there this year, it would be an excellent thing if one or two live equipment demonstrations in appropriate settings could be specially designed for their edification. However, nothing definite has yet been determined; only a rudimentary idea has been committed to paper and placed before the Committee.

The main thing at the moment is that the recommendation to organize an exhibit again this year at Wembley, and take advantage of the fine opportunity that the greater popularizing of the Exhibition will offer, goes out with the backing not only of the Gas Exhibit Committee, but of the Central Executive Board of the National Gas Council. Where there is the biggest attraction in any year, there (if at all possible) the gas industry should be; it must always—now that it is what it is, and with the brilliant prospects that are before it through the current trend in respect of coal conservation, co-ordination in the use of fuel, and the movement to reduce the contamination of the atmosphere by smoke—be in the front among the live people. For these and other reasons, we strongly commend the proposal for the second display at Wembley, and urge that the response made to the appeal for funds be prompt, solid, and worthy of a great and progressive industry, animated by a desire to be widely constructive in the present, inasmuch as it is the best assurance of continued prosperity in the future.

Meters for Hotel Fires—Do They Require Stamping?

A MATTER of detail, but one of growing importance, has been raised by Messrs. Peebles and Co., Ltd., of Edinburgh. The point is simply this, Is it compulsory that meters used for bedroom fires in hotels, boarding-houses, or such-like residential premises should be stamped? So far as we remember, the point has not been discussed before; and the responsible officers of gas undertakings of whom inquiry has been made are just as much in the dark on the subject as are our friends in Edinburgh. The latter would like to know through our columns the opinions and practices of gas undertakings regarding the stamping of such meters. The fixture of slot meters to gas-fires in hotels and other residential establishments is becoming a big business; and therefore, if it is unnecessary to have these meters stamped—seeing that the sale of gas by the authorized suppliers ends at the stamped master meter—why should the expense be incurred? The meters are only intended to regulate the sum which shall be paid by the tenant of a room to the proprietor of the establishment not only for the gas used, but for the service rendered by the fire, the piping, and meter which has been provided by capital expenditure on the part of the proprietor. Messrs. Peebles and Co. have for some time past been anxious to secure an authoritative ruling on the point; and, on our suggestion, they approached the Standards Department of the Board of Trade to learn whether or not they could help them to arrive at a decision. But nothing definite has resulted.

The Department say it is a matter involving the interpretation of the law; but they invite attention to the wording of section 17 of the Sale of Gas Act, 1859, which, they submit, appears to govern the case, and, in the view of the Department (subject to a legal ruling), renders the meters in question liable to stamping under a penalty of fine and seizure in the case of non-compliance. Upon this, Messrs. Peebles and Co. asked the Department whether section 17 of the Sales of Gas Act, 1859, is not governed by section 13 of the Gas Regulation Act, 1920, which provides that "all meters by means of which gas is supplied *by any undertakers* to any consumer shall be stamped in accordance with regulations made by the Board of Trade." To this the Department have replied that, in their opinion, the Sale of Gas Act applies to meters not covered by the Gas Regulation Act. In their view, the form of section 13 of the latter Act arises from the fact that, by the Gas-Works Clauses Act (1847) Amendment Act, 1871, statutory undertakers were exempted from the obligation of employing stamped meters. The 1920 Act restored this obligation; but the position with respect to meters not issued by statutory undertakings remains unchanged. However, they distinctly state that this is merely an expression of their view, and repeat that an authoritative interpretation of the point can only be given by a Court of Law. That is a very unsatisfactory position in respect of a matter that is already of considerable importance, and which is being enlarged almost daily. With all respect, however, we would suggest that, when the Act of 1859 was passed, the Legislature could only have had in mind undertakings actually making and selling gas, and not the question of the resale of the same gas within their own premises by the actual customers of the gas undertaking. No such resale was then contemplated, and, therefore, no such point had arisen—in fact, coin meters were not invented, and the hotel bedroom gas-fire equipment had not even been dreamed of. Regard must be had to the circumstances that existed when the 1859 Act was passed to determine what the Legislature had in view, and the meaning they attached to their own enactment. But before the 1920 Act was passed, the hotel gas-fire business was well established; but nothing is said in section 13 as to meters being tested and stamped other than those used by gas undertakings in their business.

These are only personal impressions on an interesting point, which, we think, could be cleared-up by the industry, through its central organization, submitting a case for the interpretation of the High Courts. We have not the slightest doubt that the Standards Department

would be just as interested as the gas industry and the meter manufacturers in knowing authoritatively how the matter stands. If there is no necessity to have these meters stamped, then, in the interests of the development of this line of business (which is a public convenience and a comfort in hotels and such-like places), the saving of stamping fees and the cost of unnecessary transport would be an economy worth effecting—particularly in respect of hotels in which there are a large number of rooms to be fitted. Here we repeat that the sale of gas by undertakers controlled by General and Private Acts ends at the master meter. There is no present obligation beyond that stage other than in the case of their own prepayment meter installations.

Manœuvring for Another Coal Fight.

ONE of the arch Labour agitators and Communists, Mr. A. J. Cook, the Secretary of the Miners' Federation, has been talking at a meeting of miners at Cannock, and has shown a perfect competence in strewing the path of negotiation with menaces and in making a most unholy mess of conditions and reasoning. He admits that there is a serious crisis in the coal industry; but he threatens a fierce battle with the view to setting things right—from his point of view. His wit does not enable him to see that the "battle" would make things that are bad much worse. He wants more pay for the miners out of an industry that in all but four districts to-day is making a loss per ton of disposable coal. The confusion of ideas in his mind does not enable him to appreciate that it is impossible to get a greater share of something that does not exist. If he and his like succeeded in forcing a promise for higher pay for the miners, it does not occur to him that this could not be paid without increasing the cost of coal; and then our overseas customers for coal would immediately turn to a cheaper market, and fewer miners would be required. This again would worsen the current bad conditions of the industry. Nor can he understand that to improve matters the costs of production must be reduced, and that so far as can be seen the only way of doing this is by lengthening the hours of employment. Until the costs of output are reduced, having regard to the competitive position of other countries, this country cannot possibly improve its position in respect of coal. This shortsighted legislator for "improvement" in the coal industry would attempt to do it by increasing the costs of production! This would have a very destructive result; and the unemployment in the industry to-day would be increased owing to the country's state of trade, and many people overseas refusing to purchase our dear coal. If Mr. Cook can get them to pay more for our coal than they can satisfy their requirements for elsewhere, then there might be some ground for paying heed to his claims. But the fact is that men of such an illogical bent of mind as Mr. Cook are a menace to the country's interests—particularly when placed in such a position as he occupies.

Then again his attempts to stimulate public sympathy for the miners have no sufficiently sound foundation. He tells the public that the earnings of the miners only average 10s. 5d. per shift. A good many men in the country are wishing to-day that they had the opportunity of working as many shifts per week as well over a million men have in the mining industry, and to earn 10s. 5d. per shift. They would be much happier than they are now. But the public would appreciate better the remuneration of the miners if they were told the hours worked and the productive result in that time, with the wages earned per ton of coal. In the September quarter of last year, working seven hours a day, the production was only 17·33 cwt. per man shift, and the rate of pay worked out to 13s. 8·19d. per ton of coal. As recently as the March quarter of 1923, the men were producing 18·25 cwt., working the same hours as now. A difference of 1 cwt. of coal, with (say) a million men at work, means 50,000 tons a day. In 1913, the production was 20·3 cwt. per man shift—a difference of about 3 cwt. compared with last September quarter. If the 1913 output were the rate now, the production would be upwards of 150,000 tons more per day. The low output per man-shift is one contribution towards the present poor conditions of the coal industry; and it must not be overlooked in considering any claims for an augmentation of pay.

The owners have asked the Miners' Federation to meet them in conference to see whether anything can be done co-operatively to improve the fortunes of the industry. While they are doing this, the bellicose Mr. Cook is proclaiming, with manifest delight, that we are in for a battle. Those are not diplomatic words; and they do not evidence any desire to explore all avenues to ascertain whether improvement can be effected. Such words as those used by Mr. Cook will not, as the coalowners point out, create an atmosphere favourable for discussion. But he says positively that at the end of June the wages agreement is to be ended or amended; if not, there is to be a battle, which means, if anything, a strike. But it appears that the actual programme of the miners has not yet been decided. Its formulation is the first step in what they have to do; and the second one will be to approach the General Council of the Trade Union Congress, and enlist the support of the whole Labour movement in obtaining a "living wage." The price of peace, in short, is described as a living wage and safety in the pits. Ideas as to a living wage vary considerably; and what Mr. Cook regards as a living wage, the miners by their low output per shift and high costs of production deny to many other workers. Mr. Cook is out for a general labour upheaval to assist the miners to get more money, for which they give a much depreciated value. He does not explain why other workers should help the miners. The other workers may well ask the miners, "What have you done for us?" And "Why should you have preferential treatment?" The miners work seven hours a day, and produce less per shift by 3 cwt. per man than in 1913. This lower production is an important factor in the price of coal; and the price of coal is a material factor in the manufacturing costs of other industries. The costs of other industries determine their competitive power in the markets of the world, and that power is to-day at such a low level that we have in this country an army of unemployed to support. The Gilbertian thing that the "other workers" are asked to do is to support the miners to get more money for their small day's work, and so increase the price of coal, which will make the conditions of industries dependent on coal much worse, and will not help them to lessen their unemployment. Mr. Cook says the Executive of the Federation would never give one moment's consideration to an extension of the working day. The "other workers" will note the autocratic attitude. Mr. Cook also asked his Cannock audience: "Do you want the eight-hour day?" And the response came quickly: "We want a six-hour day." Yet production is now down to 17·33 cwt. per man shift, against the 20·3 cwt. of 1913! Some of the miners do not want to work at all. There is no evidence in the production figures or in the cost of wages per ton of disposable coal that the miners care a jot for the provision, or the security, of employment of other workers. Nevertheless, other workers are to be asked to support the miners in making their own conditions worse than they are to-day. Will they be foolish enough to comply?

The Lecture Courses at Leeds.

IN last week's issue, there was a brief editorial reference to the course of lectures for the second term of the session in the Department of Coal Gas and Fuel Industries, with Metallurgy, at the Leeds University [see *ante*, p. 33]. A few further reflections may be useful in these times when educational matters are so much to the fore in the gas industry. Most of these courses are designed to suit the special needs of the industry, and those of a wider and different application are still of a character which should appeal to any member of the gas-engineering profession who looks at the question of his training and mental equipment in a broad and scientific way. It will be interesting to note whether the steps recently taken by the Institution of Gas Engineers, to encourage all the young men who are entering any branch of the industry to take full advantage of educational opportunities, will be reflected in a greatly increased attendance at these special courses which the University provides every year,

through lecturers specially chosen for the subjects with which they have to deal, and continues to provide although the attendance (apart from the full-time students of Gas Engineering and Fuel) is of a fluctuating and sometimes disappointing character. Attendance from a distance at such courses is often difficult; but they have been specially arranged so that two lectures of any course can be attended on one evening. The possibility of attendance from a distance has been demonstrated by students going to Leeds for the lectures from the North, the Midlands, and at times London and the South. But of course, for this kind of journey, and even for more moderate distances, general and financial consideration from the employer is a very important and often decisive factor.

To analyze the programme as it stands for this session: The first course on "Furnaces and the Utilization of Fuel," to be given by Prof. Cobb, is intended to be introductory to the fundamental considerations which underlie the utilization of fuel in industrial and domestic appliances, and particularly in furnaces. It will also deal with the determination of the heating power of coal and the measurement of temperatures, especially high temperatures, and with recuperative and regenerative furnaces. Dr. Parker, who has been giving special attention to the subject for some years past, is responsible for two lectures on "Waste-Heat Boilers and their Application for Fuel Saving in the Industries." Dr. Parker's intensive and extensive study of this subject at the Birmingham Gas-Works places him in a particularly strong position to deal with it from first-hand knowledge, especially as regards the gas industry. Mr. Stephen Lacey, who is again giving the course on the "Principles of Gas Distribution," is known from his work as Distributing Engineer of the Gas Light and Coke Company, which in itself guarantees a wide experience. Moreover, his paper read before the Institution of Gas Engineers at the Belfast meeting in 1923 was an admirable exposition of the subject in one of its most important branches, which the Institution distinguished by the award of the Silver Medal. The study of "Carbonization, with Recovery of Bye-Products on Coke-Oven Plants," carries its own useful lessons for gas engineers, particularly in these days when the possible utilization of coke-oven gas for public supply is so much to the fore. Mr. Finn, the lecturer in this subject, is the Manager of a large plant attached to the Manvers Main Colliery in the South Yorkshire coal-field. The metallurgical lectures, which are in the hands of Mr. P. F. Summers, will deal with the composition and use of various engineering alloys, and in the more special part with the microstructure and other properties of alloy steels. Instruction in laboratory methods of examining such alloys will form part of the course. In addition to the lectures, the laboratories will be open for students who have received some chemical training, but who desire instruction in more special subjects and the employment of the special apparatus connected with the use of fuel—such as calorimeters and pyrometers.

Last week, we tentatively made a suggestion as to these lectures being given not only in Leeds, but in other acceptable centres. But it appears that this is impracticable—definitely so in respect of the lectures delivered by experts drawn from the industry. It is plain that to get the best results from the lectures, the best men possible should be secured to give them. In accordance with this principle, the courses on "Practice of Carbonization," "Gas Purification," and "Distribution" have been given by Mr. T. F. E. Rhead, Chief Chemist of the Birmingham Corporation Gas Department, Mr. Harold Hollings, then of the South Metropolitan Gas Company, and now Chief Chemist of the Gas Light and Coke Company, and Mr. Lacey. For these experts to give the lectures, railway journeys, absence from home, and absence from important duties, are necessitated for each evening occupied, and each course takes a number of evenings. Their desire to forward higher technical education of the university standard in the gas industry and considerations of personal friendship may be, and are, sufficient to persuade them to give the lectures at Leeds; but it is not likely, or even possible, with their other responsibilities, that they would be able to spare the time to repeat the courses at various centres. No doubt similar considerations would apply, though not so forcibly, when members of the Department research staff—such as Dr. Parker and Mr. Wood—are called upon for special lectures. It must, therefore, be concluded that the special lecture programme arranged at Leeds is not of the type that can be reproduced to order elsewhere. The only practicable plan is for gas engineers, or gas engineers in training, who wish to attend the lectures to realize their very special character, and go to Leeds for them.

Subscriptions to Exhibitions.

Information as to subscriptions to exhibitions being chargeable as working expenditure in the revenue account is given in a later column.

British Empire Gas Exhibit, 1924.

The main part of the report of the Executive Gas Exhibit Committee, 1924, is reproduced in this issue. The Gas Exhibit Committee and the Central Executive Board of the National Gas Council are of opinion that both the report and the accounts (which have been audited by Messrs. Cash, Stone, & Co.) are highly satisfactory.

Murdoch's House and Holder.

We are not to have these interesting relics as memorials of the work of the originator of gas supply in this country. The Joint Committee of the Institution of Gas Engineers, the Society of British Gas Industries, and the National Gas Council have thoroughly investigated the matter, and have come to the conclusion that the idea should be abandoned. The matter has been left too long. Time has done its work. The repair of the house would now need a considerable sum; and as to the gasholder, if that was roofed-in and renovated, there would be very little of the original structure left. The reasons appear to be sufficient. The place of the gas industry in the system of daily life is a memorial to Murdoch which surpasses that which would be given by one of the houses in which he lived, or the holder about which there are doubts of its being the first constructed by the great inventor.

Lists of Gas Stockholders.

Reference was made last week to the re-issue of the invitation to subscribe capital for the Wareham Electric Supply Company, Ltd., which is being run by the Eaton machinery located at 43, Cannon Street. Of this prospectus, as of several of the same origin which have preceded it, individual gas stock and share holders are receiving a number of copies. This indicates that the organization has at command lists of the names of the share and stock holders in several gas companies, but that the lists have not been co-ordinated, so as to save the expense of printing, paper, and postage. This is a defect in the efficiency of the organization. Eaton and his collaborators should look into the matter, as such waste ought not to exist in an "enterprise" the business of which concerns the purchase of small undertakings—gas and electric—and place upon them, according to the usual tests, an enormous burden of capital. We just throw out the hint to Eaton and his associates—not to save them money, but because some gas shareholders tell us that their letter-boxes are of limited capacity.

Coke-Oven Gas for Town Supply.

In the "JOURNAL" last week, an editorial article gave an indication of the directions in which, it is stated, gasmen in America are looking for future economies. Incidentally, reference was made to the increase in the quantity of coke-oven gas which is purchased and mixed with manufactured gas for distribution to various communities. The "Iron and Coal Trades Review" has published some interesting data bearing upon this matter. It says that in the United States in 1921 the amount of coke-oven gas purchased for this purpose was 37,000 million c.ft.; in 1922, 53,300 millions; in 1923, 66,006 millions. This last figure was about 8000 million c.ft. more than the quantity of coal gas manufactured in the same period; and it represents an increase of about 80 p.ct. between 1921 and 1923. When comparing coke-oven gas figures with those for coal gas, it should be remembered that some 74 p.ct. of the gas produced

by United States undertakings is carburetted water gas, and only 18 p.ct. coal gas. If the purchased coke-oven gas is added to the coal gas manufactured, the combined 1923 total shows an increase over 1921 of something like 25,000 million c.ft., as against 24,000 millions for carburetted water gas—an increase of 25 p.ct., as compared with 11 p.ct.

Soot of the Domestic Fire.

On Saturday, Sunday, and Monday—Jan. 10, 11, and 12—there was another intense fog in and about London; and the outputs of gas made flights which strikingly endorsed once more the effects of atmospherical conditions on the demand. Dr. J. S. Owens had some interesting remarks to make about the Sunday fog; and Sunday being a day of rest for factories, his statement shows conclusively that domestic fires were responsible for the density that reigned. The fog that day, Dr. Owens says, is the worst we have had in recent years; and in Victoria Street, Westminster, it exceeded the scale of measurement. About 8 a.m. in the morning, it began to thicken—just the time domestic fires would begin to be active—and, becoming very dense at mid-day, it reached the maximum on the recording scale at 3 o'clock, and exceeded it continuously from 4 to 7 o'clock. He estimates that at the worst of the fog there was something like 250 to 300 tons of soot hanging in the air over London. On the same day, Dr. Owens made a new computation. This was the measurement of the soot particles which were raining down on the ground. They amounted to 80,000 per cubic centimetre per minute, or 515,000 per square inch per minute. This is a remarkable figure.

Coal Mining Earnings.

The data issued by the Mines Department as to the costs of production, proceeds, and profits of the coal-mining industry for the quarter ended Sept. 30 show very poor financial results. Aggregating the districts, the net surplus realized was only £64,692—a return of slightly more than ¼d. per ton of coal sold. In the June quarter, the surplus was 1s. 0¾d. per ton. Credit balances were returned in the September quarter by only four areas; others having losses from ¾d. to 6s. 9d. per ton. Of the total production of 59,163,976 tons, 54,136,824 tons were available for export and home consumption; and on the basis of the last figure, the proceeds of sale brought in 19s. 1·87d.—the net costs (deducting the proceeds of miners' coal 1·17d.) being 19s. 1·58d.—showing a surplus of 0·29d.

Coal Costs per Ton.

The costs of coal production have risen, and are likely to remain at a high level while a high wages rate is combined with a lessened output per person. Reference is made to this matter in an editorial in to-day's issue; and in connection with it the following details may be of interest:

—	Total Costs per Ton Commercially Disposable.	Wages Cost per Ton Commercially Disposable.	Output per Person per Shift.
	s. d.	s. d.	Cwt.
1913	9 5·5	6 10·5	20·3
1923.			
March quarter. . .	16 7·65	11 6·68	18·25
June ,, . . .	17 3·82	11 11·46	17·90
Sept. ,, . . .	18 11·21	13 3·26	17·42
Dec. ,, . . .	18 0·69	12 7·85	17·76
1924.			
March quarter. . .	17 11·78	12 7·30	17·79
June ,, . . .	19 3·43	13 8·00	17·48
Sept. ,, . . .	19 2·75	13 8·19	17·33

It may be noted that whereas the wages cost of production per ton has increased by 99 p.ct. over 1913, and by 18·4 p.ct. over the first quarter of 1923, the output per person per shift has fallen by 3 cwt. or 14·7 p.ct. since 1913, and by practically 1 cwt. or 5 p.ct. since the first quarter of 1923.

Midland Junior Gas Association.—At a meeting of the Association in the Birmingham Council House next Friday evening (the 23rd inst.), a paper on "Gas-Works Practice" will be read by Mr. G. E. Currier, Works Superintendent to the Smethwick Gas Department.

Illuminating Engineering Society.—A meeting of the Society will be held on Tuesday next, Jan. 27, at the Royal Society of Arts, when Mr. J. W. T. Walsh, of the National Physical Laboratory, will open a discussion on "The Effect of Internal Obstructions on the Performance of a Lighting System."

PERSONAL.

Mr. R. A. ASHWORTH, who received his training at Buxton, and was afterwards Assistant Manager of the gas undertakings at Stourport and Lichfield, has been appointed Manager and Secretary of the Tamworth Gas Light and Coke Company.

A lengthy list of members elected to the Society of Chemical Industry on the 9th inst. includes Mr. CLAUDE C. CARPENTER, Gas-Works, Monkbridge, York; Mr. MARK FRYER, South Metropolitan Gas Company, Rotherhithe; Mr. HORACE KERR, Department of Fuel, Leeds University; and Mr. KEITH O. RIDDELL, South Metropolitan Gas Company, Vauxhall.

Mr. JOHN WHITAKER, Indoor Superintendent to the Bradford Corporation Gas Department, who has been in their service for over 48 years, is to retire on March 31. He has served under four Town Clerks, six City Treasurers, and three Gas Managers. In 1877, when he started, the make was 806,812,000 c.ft.; last year it was 2,149,340,000 c.ft. There were, when he began service, 3749 public street lamps with flat-flame burners; now there are over 13,000, fitted with incandescent burners. Mr. Whitaker was one of the pioneers of the Bradford Municipal Officers' Guild, and was at the meeting at Derby, in 1905, at which the National Association of Municipal Officers was established, the chief object of which was to secure superannuation. The scheme matured last year, and Mr. Whitaker is one of the first in Bradford to benefit from it. He is one of the oldest Baildon Freemasons. Last November he was presented with a divan chair by his colleagues in the Gas Department.

OBITUARY.

We are sorry to learn of the sudden death of Mr. JOHN LEWIS, the popular Distribution Engineer to the Newcastle-upon-Tyne and Gateshead Gas Company. He was well known and greatly respected among gas engineers and others in that part of the country, having been President of the North of England Gas Managers' Association in 1910. It is some thirty years since he went from the Blackburn Corporation Gas Department to the service of the Newcastle Company. Mr. Lewis was a Director of the Newcastle United Football Club, and it was while travelling by train from Darlington to Newcastle, in company with other Directors of the Club, after witnessing a Cup Tie match last Wednesday, that he had a seizure, and lapsed into an unconscious condition, in which he passed away almost immediately. He was 55 years of age. To the widow and family, sincere sympathy in their bereavement is extended. The funeral, on Saturday, at St. Andrew's Cemetery, Newcastle, was attended by leading officials of the Newcastle and other gas undertakings, as well as members of the North of England Association.

ELECTRICITY SUPPLY MEMORANDA.

Super-nonsense.

IN America level-headed electrical engineers are getting as tired of the fantastic claims that are made in the name of "super-power," in order to capture the imagination of the public, as are their fellows in this country. In the United States the picturesque statements are made with the view of obtaining support for Government ownership. According to the New England Bureau of Public Service Information, Mr. R. F. Pack, Vice-President of the Northern States Power Company and of the National Electric Light Association, deplores the popular construction that has been placed upon "super-power." He describes it as a catch phrase. To further the propaganda, maps and drawings have been broadcasted over the country, portraying a complete interconnection of transmission lines from the Atlantic to the Pacific and from Canada to the Gulf of Mexico. In these pictures, the transmission lines cross States, pass over mountain ranges, and through unpopulated deserts. The lines are drawn without regard to cost of construction, source of power, or market for the power. Dots are placed indiscriminately about the maps to indicate proposed hydraulic power developments, all on the presumption that every stream has its Niagara Falls, and that all must be developed regardless of head, stream flow, cost of development, available market, or whether the particular stream dries up in the summer or freezes in the winter. Every coal mine is marked with a star to indicate that a steam generating station will be constructed there, so as to release half the coal-carrying equipment of the country, and reduce electric energy costs to a ridiculous figure. Of course, the thought of erecting steam generating plants at the pithead appeals to the imagination, and carrying the power from these stations over wires rather than transporting coal to some steam generating plant in a far distant city adds zest to the story. The fact that on the average 750 tons of water must be pumped for condensing purposes for every ton of coal burned is deliberately overlooked; and unfortunately for the success of

the proposed plans, Nature has not seen fit to provide an adequate water supply in the immediate neighbourhood of most coal mines. How in these circumstances electrical energy is to be supplied to everyone at a greatly reduced price is a mystery; and the authors of the fanciful maps and literature do not attempt any explanation. That is the way with these unpractical visionaries. We have a few on this side among the followers of Lloyd George, and the leaders in labour-socialism. According to these sophistical persons, their plans, if effect is given to them, would create a new heaven upon earth; and some easily gullible people wonder why these things are not speedily done.

Gas-Generated Electricity.

In this country, gas has been used for many years for the generation of electricity by private plants, and in certain places for public supply. It has also been tentatively proposed that gas-works should become the generators of electricity for supply to the local distributors, or into main transmission lines. Consideration is further being given to the question of whether the waste heat on gas-works could not be utilized for the same purpose. The application of gas to electricity generation is not therefore something new in this country. In America, the average daily production of electricity is roundly 160,200,000 KW.H. per day—an increase of about 6 p.ct. compared with 1923. Of this quantity, about 33 p.ct. is produced by water power. The Power Resources Division of the Geological Survey states that the quantity of coal used per day in generating current increased from 96,200 tons in 1919 to 106,500 tons in 1923; fuel oil, from 30,300 to 40,200 barrels; and natural gas, from 58,600,000 to 86,200,000 c.ft. per day. Last September saw an enormous increase in the use of natural gas for generating current. The total was 5,883,901,000 c.ft. for the month, or an average of 196,130,030 c.ft. per day. Of the total, California consumed for electricity generation 3,116,642,000 c.ft.; Texas, 978,712,000 c.ft.; Ohio, 526,650,000 c.ft.; and Kansas, 422,976,000 c.ft. For generating electricity many processes use the poorer grade local coals for producing gas; and this plan, it appears, is likely to develop. In this way it is estimated that some 6,000,000,000 c.ft. of gas are made and used annually for generation purposes. It is stated that if many more times this quantity were used, it would become a special problem to supply it. Then comes this somewhat cryptic statement: "Therefore it is a matter to keep in mind; for should this become an industrial gas problem, the first probability would be the providing by central stations of their own gas plants, and this would not be as well as it might otherwise be—for obvious reasons." We rather think the uppermost view in this country would be that existing gas-works were, in similar circumstances, best capable of economically producing the gas, in view of their established resources and relations with the secondary bye-products markets.

Wembley This Year.

It was definitely announced last week that the British Electrical Manufacturers' Association have decided to take no official part in the British Empire Exhibition this year; but, so far as we know, this does not determine the question as to whether the Electrical Development Association will attempt to organize a display of electrical applications. However, the members of the Manufacturers' Association will be under no obligation not to exhibit individually if so inclined. Even if they are asked to reconsider the decision, Mr. D. N. Dunlop, Director of the Association, does not think the result would be different. He calculates that the display made by the electrical trades last year cost about £1,000,000, one of the big items in which was the provision of an expert staff of attendants. Mr. Dunlop says that for the good of the Empire the expenditure was incurred last year; but with heavy exhibits it is impossible to say whether the returns justified the costs involved. On the other hand, the "Electrical Review" is inclined to think that in respect of electrical applications, there should be a popular demonstration in some form. This is what our contemporary says: "So far as we can judge, there is little disposition on the part of either the electricity or the gas interests to dip into their resources heavily for co-operative popular displays. Yet, considered electrically, it is impossible not to feel that where the throng goes, even on pleasure bent, there is an excellent opening for an attractive popular demonstration. Possibly, though this may not be found practicable through the established organizations, there may be some ground for suggestions of an electric village or town organized by a few manufacturers and traders co-operatively, which recently appeared in the daily Press." Information as to what the gas industry proposes is given in an earlier column of the "JOURNAL."

Shoddy Work v. the Regulations.

Mr. R. H. Rawll has contributed an article to the "Electrical Review" on the new wiring and fittings regulations of the Institution of Electrical Engineers. This gentleman has had an opportunity of hearing expressions of opinion concerning the subject from a diversity of points of view; and the result is that he has arrived at certain conclusions. We will not touch upon them all; but there is one section of the article which has paramount importance, and which might well be presented as an argument for the full regulations just as much as for the modified form which he suggests. Safety is the fundamental purpose of the regulations. Mr. Rawll feels that their real object is to protect the general public from the wiles of the unscrupulous and incompetent wireman; but that they will be successful in achieving this, is entirely problematical. He does not, however, discuss the reason why this is so. That reason is simply that there is no authority to enforce the rules. If there were, then they would supply a beautifully comprehensive standard to which to work. There need be no hesitation as to the cost; for the roving operations of cheap-jack wiremen injure the reputation of the electricity supply industry, and impose subsequent expense and inconvenience upon their victims. If these conditions were removed by a compulsory better standard of work, possibly in the long run it would pay well both the industry and the consumer. Mr. Rawll himself practically admits this when he says: "The subsequent extra expense and inconvenience, which inevitably falls on the shoulders of the victim of the cheap-jack wireman, in many cases permanently prejudices the consumer as to the decided advantages of electricity, and retards electrical progress to a greater extent than many think." Then there is another pregnant passage: "It has often been argued that the man who employs a person of doubtful qualifications has only himself to blame if the resulting work is unsatisfactory. That, however, is not the point. Electrical installation work, by its very ease in execution compared with other modes of supplying energy, lends itself very easily to shoddy workmanship. The presence of bad workmanship, for example, in a gas installation would be detected almost at once; but in electrical work the fault might not manifest itself for a considerable time, and then, perhaps, with disastrous results." That is genuinely frank. To Mr. Rawll it is perfectly clear that there should be some recognized standard of wiring. His opinion is that the Institution should, after discussion with all interests involved, issue a set of "recommended" wiring rules of a more modest character than those recently published, and that these should be limited in their scope to buildings not of a factory character. This exception of factories is probably due to the view that the electrical section of the Factory Acts is based on sound common sense and practical experience. Supposing Mr. Rawll's suggestion was adopted by the Institution, the result would be as negative as is the case with the regulations as they stand—there is no body who can enforce them. That is a point which should be taken up by the electricity supply industry; and statutory power should be obtained. By no other means will the installer of shoddy wiring be extirpated. The mere pointing-out to new consumers, by supply undertakings, of the desirability of placing wiring with electrical contractors only on the understanding that the wiring should be in accordance with the recommended rules, would not be enough.

The Contractors' Attitude.

While the electricity supply authorities are much opposed to the new regulations, the electrical contractors up and down the country are favourable to them. There has been allegation that the Electrical Contractors' Association are plotting with the Committee responsible for the formulation of the rules for making them compulsory. Perhaps it would be a good thing for the industry if they were; but Mr. H. Marryatt, of Messrs. Marryatt & Place, repudiates such a suggestion as nonsense. The fact is that the contractors throughout the country are persuaded that the new wiring rules will be a help and not a hindrance to progress. They are in a good position to judge. As a matter of fact, the genuine contractors appear to be more keenly alive to the importance of eliminating bad wiring installations from the industry than the supply people themselves. It is a good thing for the future that there is at all events one class of business men in the industry with a preference for standards as perfect as they can reasonably be made.

Fatality Through an Electric Radiator.

Occasionally, there have been accidents to persons through clothing coming in contact with gas-fires. Our electrical friends have been known to make a point of this in proclaiming the safety of appliances electrically heated. If clothing comes in contact with electrically heated appliances, the consequences would be precisely the same. Proof of this was given in Hampstead on Thursday, the 8th inst. Mrs. Louisa Holmes, age 77, had been on a visit to relatives; and there was a sad ending to what had doubtless been a very happy time. She was packing with a view to departure when her clothing came in contact with an electric radiator. She was severely burned and died three hours later.

"The Elements of Railway Economics."—The first edition of this book, written by Sir William M. Acworth, K.C.S.I., M.A., of the London School of Economics, filled a definite want, and was reprinted in 1905, 1911, 1921, and 1923. A new edition, in which the facts have been brought up to date and three new chapters added, has just been published by the Clarendon Press, at 3s. 6d. net. This has been written by Sir William Acworth and Mr. W. T. Stephenson, B.A., Cassel Reader in Transport, London University.

NATIONAL GAS COUNCIL.

Central Executive Board.

The Central Executive Board of the National Gas Council met on Tuesday, the 13th inst., at No. 28, Grosvenor Gardens, S.W.—Mr. D. MILNE WATSON in the chair.

PRIVATE BILLS BEFORE PARLIAMENT.

Parliamentary work in connection with Private Bills being introduced into Parliament this session was discussed, and a Committee appointed to deal with this matter.

THE EDUCATION SCHEME.

The Board agreed to adopt the recommendation of the Joint Finance Committee of the Institution of Gas Engineers and the National Gas Council, that a sum of £500 in respect of the year 1924, and a further sum of £500 in respect of the year 1925, be granted to the Institution of Gas Engineers towards the amount required for their Education Scheme, and that the matter be again considered towards the end of 1925.

MURDOCH HOUSE AND GASHOLDER.

It was reported that, as a result of the deliberations of the Joint Committee formed of representatives from the Institution, the Society of British Gas Industries, and the Council, the proposed scheme with regard to the acquisition of Murdoch's house as a national memorial had been abandoned, as it was ascertained that any attempt to repair the house would involve a considerable sum of money. It was suggested that the gasholder should be roofed-in, at a cost of something over £2000. Further investigation, however, revealed the fact that by the time these renovations were finished, very little of the original holder would remain. The Committee, therefore, were reluctantly obliged to recommend the Board not to proceed with the scheme—a decision which was greatly influenced by the doubt expressed in correspondence appearing in the Technical Press as to the holder in question being the first Murdoch holder.

CENSUS OF PRODUCTION.

The draft schedule which the Board of Trade had already modified in accordance with suggestions made to them from several quarters had been circulated by the Council among the Board, together with certain suggested amendments, and members had been asked to forward further suggestions which they considered desirable. These suggestions were dealt with in detail, and it was left to the officers of the Council to communicate with the Board of Trade.

EXHIBITION SUBSCRIPTIONS AND INCOME-TAX.

The question of whether subscriptions to the British Empire Exhibition are admissible as working expenses for the purpose of assessing subscribers' liability to income-tax has been raised at Morpeth. The Gas Company contributed a sum to the Wembley Gas Exhibit; and a new Inspector of Taxes appears to have challenged their right to charge this to revenue account. There can be no question that it is a legitimate advertising expenditure, and has a right to be set against profits. Apart from it being a contribution to an object of national importance, we cannot see on what logical ground the objection to its exemption from taxation has been raised. The matter is of general interest; and we are obliged to Mr. R. Lockey, the Manager and Secretary of the Company, for calling attention to it.

It may be stated emphatically that such subscriptions are a proper expenditure, and must be allowed to remain as a charge in the revenue account. Their admissibility as working expenses for the purpose of assessing subscribers' liability to income-tax is dealt with in the "General Regulations" issued early in 1924 by the British Empire Exhibition. No. 33 of these reads as follows:

The Exhibitors' Trading Accounts and Inland Revenue.

It is understood that the Inland Revenue Authorities, in dealing with trading accounts submitted to them by exhibitors, will treat the cost as and when incurred of participation in the British Empire Exhibition, including any expenditure under the guarantee, on the same lines as the cost of advertising generally, and in normal cases will take no exception to such expenditure being admitted as a deduction.

The propriety of making an allowance in respect of subscriptions to the British Empire Gas Exhibit has, we believe, been questioned by inspectors of taxes on two or three occasions; but we are unaware of any case where an inspector has declined to treat such subscription as an allowable expense where his attention has been drawn to the regulation in question.

Application was made to the Ministry of Health on behalf of Urban District Councils, and sanction was given for the payment of reasonable contributions to the fund. We are aware that all the Urban District Councils who made application to the Ministry received the necessary permission.

We know, too, that the "B.C.G.A." have an agreement with the Income-Tax Authorities, following an interview with the President of the Local Government Board (whose powers are now vested in the Minister of Health), to the effect that contributions to the work of the Association would be recognized as legitimate expenditure, and would not be made the subject of a surcharge by the local auditor. During the twelve years of the existence of the Association, they have never had a case where objection has been raised to such contributions.

BRITISH EMPIRE GAS EXHIBIT, 1924.

Executive Committee's Report to the Gas Exhibit Committee.

The Gas Exhibit Committee of the British Empire Exhibition, 1924, met last Tuesday to receive and consider the report of the Executive and the accounts as audited by Messrs. Cash, Stone, & Co., Chartered Accountants. By previous invitation, the members of the Central Executive Board of the National Gas Council were present.

On the motion of Alderman J. S. PHILLIPS, seconded by Sir WILLIAM KAY, the report of the Executive Committee of the Gas Exhibit Committee was adopted. In the accounts were inserted the estimates of income and expenditure as submitted to the Committee on Nov. 20, 1923, for the purpose of comparison; and the figures showed how close the distribution of expenditure had been kept to the original estimates.

The balance of income in excess of expenditure at the date of audit, shown as "balance subject to contingent expenses, £165 1s.," has to meet the cost of audit and sundry small items of expenditure subsequent to the closing of the books; but the account will finally close with a balance of about £100 in hand.

This it is proposed should be carried forward to the account of the 1925 exhibit, if it should be decided to organize one, or, alternatively, be transferred to the British Commercial Gas Association for expenditure on general publicity.

The receipt of £966 5s. from overseas undertakings is a very gratifying feature in the accounts.

Judging by all the evidence available as to the improvement in the demand both for gas and for gas-consuming appliances throughout the industry during 1924, the Executive are of opinion that the £75,000 expended on this co-operative enterprise has been profitably invested. Moreover, the results of such an exhibit are to be judged not merely by the business directly traceable thereto, nor even by the immediate improvement in business generally, but by the effect upon business over a period of years; and it is, therefore, fair to assume that, the immediate results having been so notable, the ultimate profit to the industry will be many times the cost.

The Executive are of opinion that the expenditure of £38,953 on publicity of various descriptions at and in connection with the exhibit greatly increased the value of the enterprise to the industry; served to bring the possibilities of gas and the facts concerning its service to the Empire forcibly before a much larger number of people than ever visited Wembley; and improved materially the relations between the Press and the industry.

The thanks of the industry are due to the undertakings which provided at their own cost the necessary officers for staffing the exhibit.

The Executive desire to express their thanks to all those who co-operated in the planning, design, construction, equipment, furnishing, and decoration of the exhibit; in its organization and management throughout the Exhibition; and in the many-sided publicity campaign. They have made some financial recognition of the services so rendered. But such recognition necessarily could not be commensurate with the value of those services; and the Executive desire especially to place on record their appreciation of the fine spirit of unselfish, willing, and enthusiastic co-operation displayed by all from start to finish.

For the Executive Committee.

F. W. GOODENOUGH,
Chairman.

28, *Grosvenor Gardens, S.W.* 1,
January, 1925.

"Gas-Meters."

Mr. F. A. R. Filer, Foreman of the Meter Repairs Department of the Ryde Gas Company, has sent us an appreciative reference to Mr. A. T. Gilbert's book on "Gas-Meters: Their Construction, Use, Fixing, Inspection, and Maintenance." He says: "May I draw attention to the new handbook recently published on 'Gas-Meters' by Mr. A. T. Gilbert? As a practical meter maker coming in contact with meters under working conditions, I must say I appreciate the very thorough manner in which the author has tackled a much neglected subject. The lucid and interesting presentation of the technical details, combined with helpful and useful data arranged in handy form, make the book one which should be in the hands of all those in the gas industry whose duties bring them in contact with meters and the gas-consuming public. There is also food for very serious thought even for the gas-meter makers themselves." The book can be obtained at the "JOURNAL" Office, price 7s. 6d., or by post 6d. extra.

A TRUNNIONLESS TIPPING SKIP.

There are various directions in the running of a gas-works plant in which a satisfactory tipping skip is of great importance. The economy associated with mechanical handling needs no elaboration. All employers of labour where the transport of materials is concerned are constantly engaged on the problem of the best devices available for particular purposes.

In gas-works may be found in use for the conveyance of various materials telphers, overhead runways, aerial ropeways, &c. Skips or buckets are employed in connection with them; and these have hitherto been almost universally of the trunnion or revolving type. The improved type of skip which is illustrated in figs. 1 and 2 has been designed by Mr. H. A. Sturgess, of No. 3, Mountlay Road, Eastbourne, and possesses several features of special interest to gas engineers. It discharges automatically and instantaneously; the material is deposited directly downwards; the skip is positively cleared of its contents whatever their nature may be; and it closes and locks automatically in readiness for re-loading.

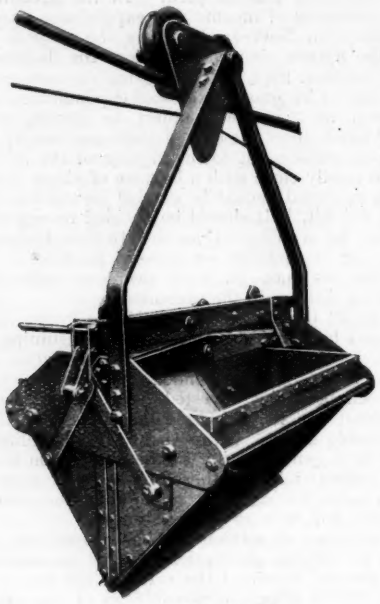


Fig 1.—Skip Closed.

Fig. 2.—Skip Open.

The skip, strongly constructed, is on the well-known grab principle. The two jaws, of scoop shape, are pivoted in a stout framework, and are connected by levers arranged so that when the skip arrives at its pre-determined point of discharge, the lever is mechanically operated to release the locking plate, and the jaws open on their pivots to the position shown in fig. 2. The contents of the skip are instantaneously discharged downwards; the flat sides of the skip preventing any clinging of material, even of clay or other sticky substance. When the skip returns to the desired position for re-loading, a projecting lever, on coming into contact with a fixed cam rail, operates the two jaws of the skip; and thus the skip is closed ready for loading-up again. This mechanical operation dispenses with the services of one or more men, and of course effects an important saving of time, as compared with the usual system.

It may be added that, whereas in the old type of skip an objectionable pendulum motion is set up, due to the contents being discharged sideways during rotation on the trunnions, in the skip now described no motion of this kind can occur. As is well known, in the old type, where the material carried is wet or sticky, it often happens that a large proportion of the contents cling to the sides of the skip, causing serious diminution of carrying capacity. The invention has been patented.

COKE PRODUCTION AND CONSUMPTION.

At the last meeting of the German Gas Association, Dr. K. Bunte, of Karlsruhe, presented a long paper on this subject. This was reproduced in "Das Gas- und Wasserfach" for Dec. 13, 20, and 27. The heads under which Dr. Bunte dealt with his subject may be briefly summarized as follows; the paper dealing generally with the need for producing coke of good quality, and the means for doing so.

1. Coal should be carbonized as fresh and as soon after delivery as possible. The extent to which this can be practised naturally depends very largely on storage facilities.

2. Coal should be as small and as even in size as possible before being introduced to retorts, the degree of fineness being limited, of course, by the necessity of the charge being porous to gas. Naturally high-ash small coal, or that which is broken in transport or handling, is not to be compared with properly crushed coal.

3. Coals rich in gas and bitumen should be mixed with poorer sorts. The improvement in coke quality must then be regarded as compensating for the reduced gas output, and for the cost of coal breaking and mixing.

4. Mixtures should be kept as even as possible as regards various kinds and sizes of coal, with the object of avoiding the formation of cracks.

5. Slow carbonization should be aimed at, with even temperatures not worked up too high. In this connection, it is important to remember that the slower carbonization contemplated is not necessarily achieved by the longer carbonizing periods required by coal which contains much rough small. The striving after high oven efficiencies by means of high temperatures may often lead to undesired results in other directions.

6. The finished coke should not be allowed to stay too long in the retort. For water-gas production, it is nowadays often subjected to further heating, but, even if this process does tend to lower temperatures in the retort, no doubt changes continue to take place in the coke substance, which lead to splitting, cracking, and friability.

7. According to the purposes for which the coke is required, attention must be paid to easy ignition and ready combustibility.

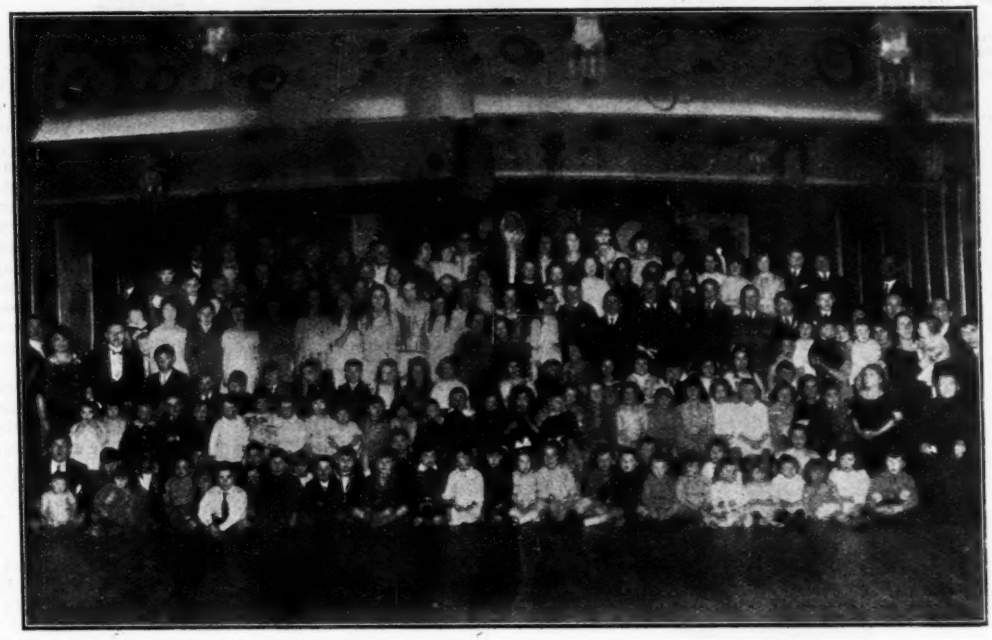
8. Careful handling in quenching and dispatch is essential.

9. The lowest possible water content should be aimed at. Moisture in coke, even when prices are reduced accordingly or sale is by measure, often prejudices customers in favour of a bye-product coke which may be bad in other respects and really less suited for their purposes, but which is dry.

In Dr. Bunte's opinion, in order to maintain coke sales and prices, good coke must be produced, and quite considerable costs in the way of coal, plant, and wages are justified to this end. Any considerable variation in the relation between coal and coke values might, in certain circumstances, justify even far-reaching technical changes. The price of coke is the primary factor in the relative cost of water gas to that of coal gas, and, in the present coal situation in Germany, an important factor in determining the nature and quality of the town gas supplied. Falling coke prices may, in certain circumstances, even demand the consideration of a resumption of carburation, in order to be able to increase water-gas supply. The question of central producers with low-grade fuel or separate producers with good coke depends also very largely on the state of the coke market. In every way, coke quality is intimately connected with the whole question of gas-supply development.

Electrical Engineers' Presidential Certificate.—Mr. J. Ferguson Bell will to-morrow (Thursday), at 6 p.m., at the Institution of Electrical Engineers, Victoria Embankment, formally present to that Institution the Presidential Certificate offered by the Council of the Institution of Gas Engineers. This has been designed by Mr. F. D. Marshall, who designed the certificate for the Institution of Gas Engineers which was presented last June. The certificates are, in fact, nearly identical in appearance. Members of the Institution of Gas Engineers will be cordially welcomed on the occasion.

EDINBURGH GAS DEPARTMENT CLUB.



To Mr. H. H. Gracie, the Engineer and Manager of the Edinburgh Corporation Gas Department, we are indebted for the accompanying photograph which has reference to the Welfare Club run in connection with the Department. Last Christmas the Club entertained about 250 children of the members in the Club Rooms, Carlton Halls, No. 38, York Place, Edinburgh; and our illustration is a flashlight picture of the happy party. The fostering of this co-partnership spirit is sure to be fruitful in good results, and is warmly commended.

FUEL, SOLID, LIQUID, AND GASEOUS.

PROF. BRAME'S BOOK.

[Reviewed by HARALD NIELSEN.]

It is no easy task to write a book dealing in 381 pages so adequately with fuel in various forms and shapes as Prof. Brame has done.* From year to year the subject grows in magnitude. More and more research workers throughout the world are absorbed by fuel laboratories, and it is almost impossible for anybody to attempt to keep abreast of times in this particular direction. New ideas, new methods, new conclusions drawn from these are every day upsetting old-established practice, rules, and regulations. When, in spite of all this, Prof. Brame sits down and produces an excellent book—or shall I call it a series of excellent, comprehensible lectures?—all within 381 pages from a subject the very magnitude of which would frighten most people, he has my respect.

I can well imagine the amount of work entailed in condensing, abstracting, and deciding what to include and what to leave out, from a subject on which so much has been written, in so superficial a manner, and on which in reality so very little is known for certain. That minor errors should creep in, is almost impossible to avoid. For instance, on p. 6 is mentioned that detonation takes place in an internal combustion engine. Thank goodness it is only a mere explosion. There is a great difference between the two expressions. On p. 93 a small percentage, 0·07, of paraffin oil is claimed to assist combustion of powdered fuel. This works out at 1·5 pints per ton, and obviously not 1·5 pints per 1800 tons, as stated.

On p. 113 is given a résumé of various low-temperature carbonizing processes, and the one referred to as Wilson's (see "Engineering," 1922, 347), a rotary inclined cylinder, internally fired with producer gas, should probably be Nielsen's retort, internally heated by producer gas. The figures given on p. 234 regarding gas produced from coke during the blow period—namely, 123,000 to 124,000 c.ft. of 110 B.Th.U. gas from two-thirds of a ton of coke—seem misleading. The correct figure is more likely to be in the neighbourhood of two-thirds of this quantity. I am rather surprised to note that no mention is made of the Humphreys and Glasgow plants, as this firm have, if my information is correct, erected a very large number of water gas plants.

A statement on p. 249 might be challenged—namely, that a fuel high in moisture would require less steam from exterior sources for producer gas manufacture, and that many peats would not require any additional steam. This is hardly correct, as the moisture is evaporated in the upper zone in the producer long before the reaction temperatures are reached by the dried fuel, provided, of course, that the producer is worked correctly. Prof. Brame is not correct in assuming that mechanically-operated producer feeds only offer theoretical advantages, and, therefore, are seldom employed. This is hardly so, as the modern tendency is to go for mechanical feeds; and, without exaggeration, it can be said that for every one large hand-feed producer installed, ten mechanical-feed producers are erected.

Coming towards the end of the book, Prof. Brame indulges in economics. That is all very well, as long as mid-Victorian prices of 14s. to 18s. per ton of tar, anthracite at 22s. per ton, and town gas at 2s. per 1000 c.ft. (why not state therms?) are not used. The engineer-in-charge is more directly interested in what he can produce his power for to-day. It should be possible for Prof. Brame to make a proper analysis of all the figures which go to make-up the cost per KW.-hour, H.P., or whatever is required. Capital cost, labour, depreciation, maintenance and repairs, lubricants, stores, water, &c., can now be said to be fairly stabilized, and these figures can be given independently of the fuel cost for each kind and size of power plant, together with the heat consumption per unit at different load factors. This information would be of some real use.

The analytical part of the book is good, particularly the section dealing with calorimetric determination, and I feel sure that every user of the Lewis Thompson abomination will get a thrill of pleasure when reading Prof. Brame's lucid description of his troubles with this calorimeter.

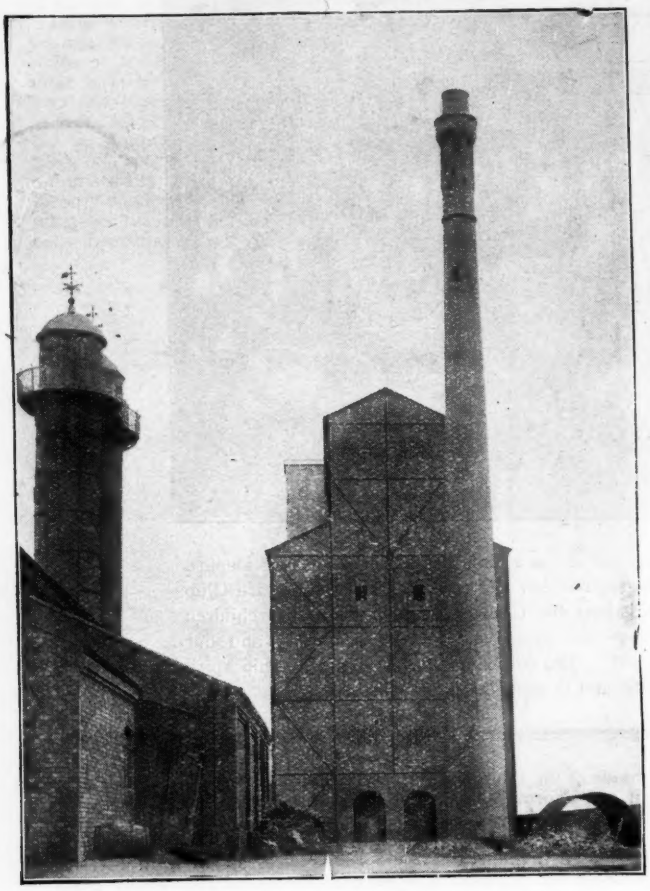
*"Fuel, Solid, Liquid, and Gaseous," by Prof. J. S. S. Brame, of the Royal Naval College, Greenwich. London: Edward Arnold & Co.; 1924. Price, 18s. net.

Reactivity of Coke.—In a recent issue of the "Revue de Métallurgie," Arend and Wagner give an account of measurements of the reactivity of coke. At 1000° C. they found that the rate of reduction of carbon dioxide by various coke samples was as follows: Wood charcoal, 99; ordinary coke, 70; beehive coke, 40; retort carbon, 20. The differences between the cokes grew less as the temperatures increased, so that at 2000° C. all fuels would be identical.

WORKING RESULTS AT HINCKLEY.

A Year's Working with Woodall-Duckham Verticals.

Last week, thanks to the courtesy of Mr. F. Lee, the Engineer and Manager, we were able to inspect the Woodall-Duckham vertical retort plant, which has been in operation since September, 1923. It was in July, 1921, that the Hinckley Urban District Council placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for an installation of a capacity of 900,000 c.ft. of 500 B.Th.U. gas per day; but owing to delays in obtaining the Board of Health sanction for the work, the construction of the plant was not started till July, 1922. Gas making was commenced in September, 1923.



VIEW OF THE RETORT HOUSE.

Brief Description of Plant.

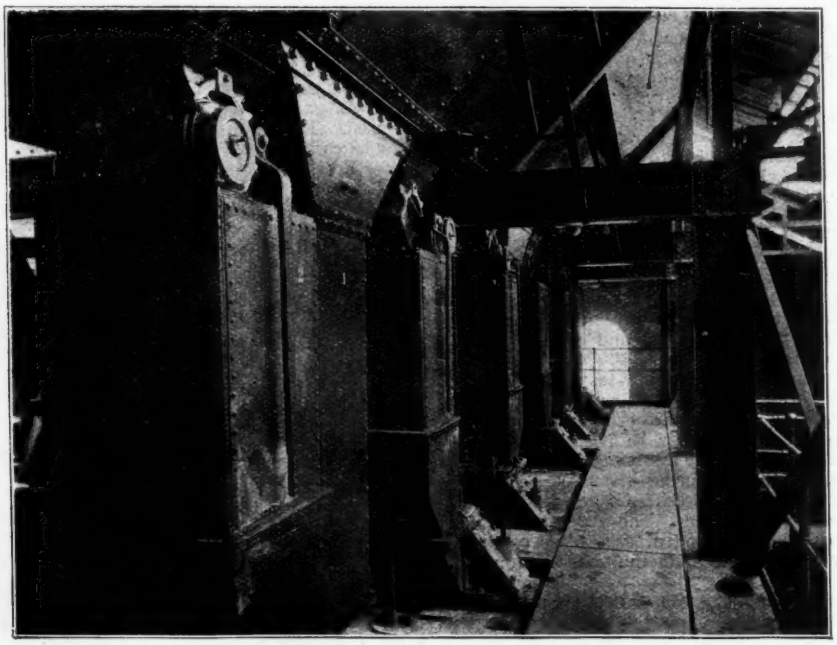
The Hinckley plant consists of twelve continuous vertical retorts built in settings of four. Each setting has its own recuperator and producer. The retorts are constructed of first-grade silica material, to ensure low maintenance costs under conditions of high throughput and thermal yield; and the producers are of the step-grate type designed to give ample grate area and to need the minimum attention for clinkering.

On arrival at the works, the coal is discharged direct into a receiving hopper placed at ground level. From this it passes through a breaker and is delivered into a gravity-bucket conveyor of a capacity of 25 tons per hour. It is thereby elevated and subsequently discharged into overhead storage hoppers situated over the retort bench, which will hold 48 hours' supply of coal and producer coke, thus obviating the necessity for raising coal or coke during the week-end. From these overhead hoppers, the coal passes into auxiliary hoppers on the top of each retort.

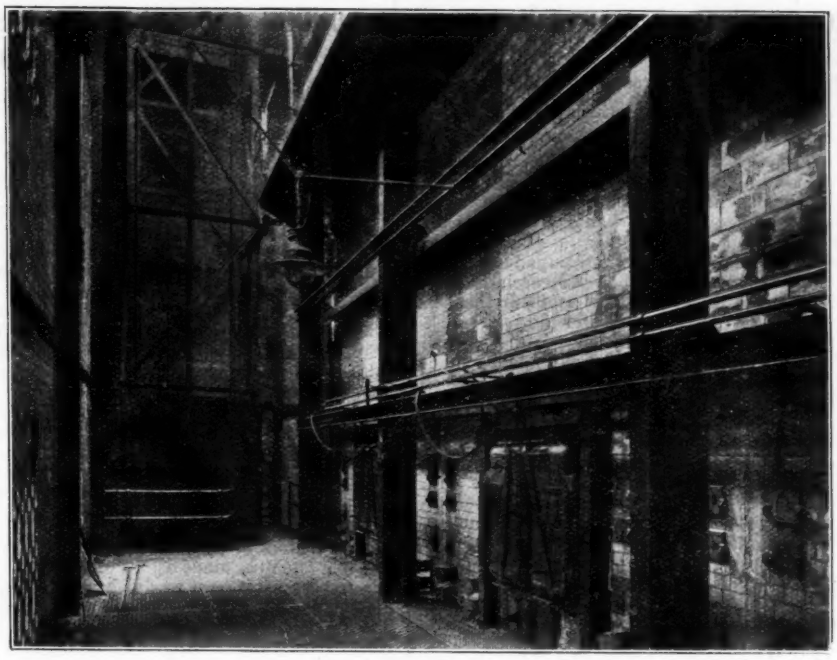
Arrangements are made whereby the speed of extraction of the coke may be regulated for each retort; the power requirements for the extractor are small, being supplied by a 1½-H.P. steam engine. The coke, after passing the extractor, collects in a storage hopper situated immediately below, whence it is removed at 2-hourly intervals through a water-sealed discharger, and is delivered into skips.

Working Results.

The results from Oct. 1, 1923, to March 31, 1924, and from April 1 to September 30, 1924, were supplied to us by Mr. Lee, and were investigated. Throughout the whole of the year's working the entire gas supply has been derived from the Woodall-Duckham plant, so that none of the results is modified or interfered with by water gas production or the gas from any other plant. Moreover, throughout this period regular conditions were maintained, so that the figures obtained typify not what can be obtained by special test, but what has actually resulted from normal working. It may be said at once that the normal working at Hinckley is good. We were impressed, for instance, by the order and cleanliness of the plant, and the careful and—equally important—constant supervision. It is not an uncommon thing to find a high gas make per ton which, when investigated, is due to measurement of the gas being made above normal temperature and below normal pressure, with determination of the calorific value under standard conditions. Such a course only results in a high figure for unaccounted-for gas. But the gas at Hinckley is measured, on the average throughout the year, at approximately standard temperature and pressure—a fact which is no doubt responsible for the low leakage account, which for the year ended March 31, 1924, was only 2·23 p.ct. And then, of course, calculations of thermal yields are very much dependent on the accuracy of the calorific value tests, which are often vitiated by slight thermometric errors. It was therefore good to find that the thermometers at Hinckley had been tested and proved correct. So we could go on; but sufficient has been said to indicate that the results at Hinckley are not haphazard. The coals carbonized



THE AUXILIARY COAL HOPPERS.



THE PRODUCER STORAGE.

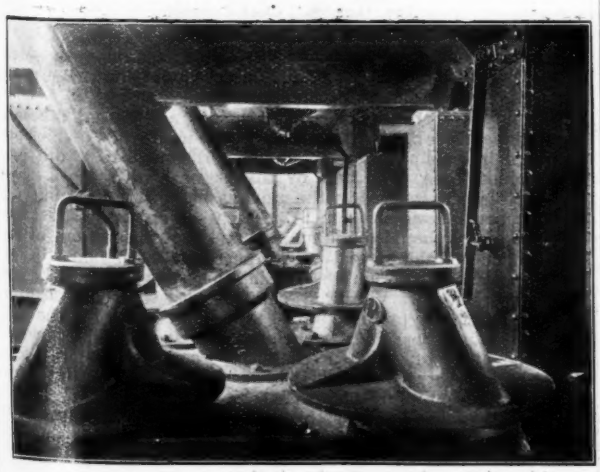
were Derbyshire, Yorkshire, and North Staffordshire screened coals and nuts. The following are the results:

Results of Year's Working.

	Oct. 1, 1923, to March 31, 1924. Therms per Ton.		April 1 to Sept. 30, 1924. Therms per Ton.
Gas made	81·6	..	81·5
,, sold	78·6	..	78·6
,, accounted for	79·3	..	79·5
Calorific value, B.Th.U.	492	..	488
Coke sold per ton of coal*	9·84 cwt.	Sold and in stock	9·85 cwt.
		Used on works, excluding coke for heating retorts	1·70
		Coke and breeze available	11·55 cwt.
Tar sold	16·0 gallons		15·6 gallons

*During eight months of the twelve, one of the settings of four retorts was under slow fire, but no gas was made; otherwise the coke sold would have been greater.

The coke is dry, and when properly graded is useful for domestic purposes. Readers of the "JOURNAL" will perhaps remember that in the issue for Nov. 19, 1924, Prof. Boys' method of burning coke in the domestic hearth was outlined. In the men's quarters at Hinckley there is a fire designed on the lines set out by Prof. Boys, and the coke burnt is from the Woodall-Duckham verticals. The appearance and efficiency of the fire are remarkably good.



Gas Uptakes, Disc Valves, &c.

The following is an analysis of the tar:

Analysis of Tar.

Sp. Gr at 15° C. = 1·08

	P.Ct. by Volume.
Distillation—	
Water	3·25
Fractions to 170° C.	4·50
170° to 230° C.	21·00
230° to 270° C.	9·20
270° to 350° C.	28·00
Residue and loss	34·05
	100·00
Free carbon	6·26 p.ct.
P.Ct. ash in free carbon	0·49 p.ct.

The calorific value of the gas made at Hinckley is 490 B.Th.U. per c.ft.; and this gas, Mr. Lee tells us, is highly satisfactory for both lighting and heating, for it is capable of efficient aeration. An analysis is as follows:

Analysis of Gas.

	P.Ct.
CO_2	2·8
O_2	0·8
CO	14·3
C_nH_m	1·7
CH_4	22·5
H_2	45·0
N_2	12·9
	100·0

LABOUR COSTS.

The labour costs at Hinckley are higher than they would be if the plant were working at its full capacity. The rating, as mentioned before, is 900,000 c.ft. of 500 B.Th.U. gas per day; but at present the daily make is from 600,000 to 700,000 c.ft. With this make, the carbonizing costs for the twelve months ended September, 1924, work out at 2·97d. per 1000 c.ft. A little extra paid for labour, however, is probably more than counterbalanced by the efficiency resulting from good retort-house conditions. We had the opportunity last week of seeing two retorts which were off for scurfing; and the condition of the walls was excellent.

Gas Meter Leakage.—In a communication from Mr. Albert T. Gilbert, the author of "Gas Meters," it is stated that in the past there has been much discussion of the subject of district maintenance of consumers' fittings and appliances; the recent paper by Mr. W. R. Moger [see "JOURNAL" for Dec. 31, p. 902] being a typical example. "There is, however," says Mr. Gilbert, "a very important aspect of the proposal, which has not yet been put forward. Such a scheme would provide an excellent opportunity for testing meters *in situ* and noting whether the by-pass consumption is registered. During the examination of the fittings the plugs of all cocks would come in for attention; and it would be found that thousands of these, when worn, allow a very small quantity of gas to escape which is unnoticed by the householder and also by the meter. There is considerably more leakage on the consumer's side of the meter than takes place in the mains."

BRONZE WELDED JOINTS.

Experiments on Cast-Iron Pipe.

Descriptions have appeared in the American Press of tests in connection with the bronze welding of cast-iron pipes. This process had been suggested as an alternative to the standardized methods of cast-iron welding, which were found unsuitable because of the difficulty and expense of preheating the joint. Some work had been done on the Pacific coast, where a bronze-welded gas main had been laid; and then, in order to secure definite data on the matter, the Linde Air Products Company called in the aid of the Union Carbide and Carbon Research Laboratories, to determine the cost of welding, to establish the best welding technique, and to study the strength of the joints.

It was soon found that gas-welded joints in cast-iron pipe—of either the sand cast or centrifugal variety—could be made with a standard bronze rod and commercial flux. The method is very simple. Square ends of pipe are butted together, and a ridge of bronze built-up with the oxy-acetylene flame, extending clear around the pipe like a collar. The temperature is far below the melting point of the cast iron—in fact, only a minute film of the iron is alloyed with the overlying bronze. This film, however, effectively joins the pipe to the weld metal, resulting in what may be described as a bronze collar shrunk around the pipe and attached to it by an alloyed layer of great strength.

To indicate the effectiveness of the joint, an account is given of a strength test, in which two 2½ ft. lengths of pipe were bronze welded into one piece. The butting ends were square, and fitted fairly closely. After the pipe had been laid across two supports about 3 ft. apart, with the joint midway between them, a piece of metal 3 in. wide was placed immediately to the left of the joint, to receive the blows of a 6-lb. sledge-hammer. Four heavy blows were struck without apparent result; then four blows on the right of the weld broke-out a piece of the pipe wall between the joint and the support; and several more blows knocked-out some small pieces of pipe, so that the hole extended up to the weld, but not into it. The section containing the welded joint was next sawn from the pipe and examined, when it was found that the weld metal was in no way injured, nor was it separated from the cast iron. In another test, a joint was sawn longitudinally, and the pipe then flattened-down on an anvil. Though the pipe broke into several pieces, the bronze collar remained intact, and held as firmly as ever.

The laboratories then set out to determine what lengths could be welded so that the whole should safely support its own weight when suspended from the ends. For this purpose 12-ft. pipes were made-up into lengths of 36 ft. On some lengths the butt weld described was used, while on others the pipe ends were bevelled to form a welded V-joint. The gradual application of a load demonstrated that the bronze butt-welded joint developed about twice as much strength as the welded V-joint. Other investigations were as to the effect of electrolysis and soil corrosion on the welded joint, and close examination was made of the microstructure of the cast iron in the vicinity of the weld. All the experiments and tests indicated that both centrifugally cast and sand cast iron pipe can be very successfully joined by the oxy-acetylene process. It is added that bronze welding of cast iron pipe is not difficult, and that it is now being used on many mainlaying jobs.

Gas for Sweet Making.

The Beech-Nut Company of California, whose location is in the city of San Jose, manufacture hard candy fruit drops, and the extent to which gas is employed by them in the process has been described by Mr. R. G. Van Gundy in the pages of the "Gas Age-Record." By adopting this fuel, of course, the fundamental factor of cleanliness is assured, and the temperature is absolutely under control. After the desired period of heating in a copper kettle, the candy is poured on a water-cooled table, which gives it a rapid chill, and prevents the sugar from crystallizing. The next operation is flavouring and colouring, after which the plastic mass is placed on a gas-heated spinner and turned over and over, shaping it into a long, round piece of candy about ¾ in. in diameter. Cutting, &c., then follow. The furnaces employed are of standard confectionery type, and were originally equipped with ring burners. These, however, have been removed and replaced by nozzles on a manifold, so arranged that the blast from them is sent out horizontally into a carborundum refractory bed. A blower, controlled by a rheostat, furnishes the necessary air. With this equipment the operating time has been reduced to 17 minutes, as against the 35 minutes per batch which was required with the ring burners, and at the same time the consumption of gas per batch has been reduced. In addition to the point of cleanliness, the quality of the product has been improved by the use of gas fuel, because in boiling the mixture the best results are obtained when the desired temperature is reached as quickly as possible. The Beech-Nut Company use coke in some of their plants, and a comparison of the cost shows gas to be the cheaper of the two. There are also, of course, other advantages appertaining to the use of gas.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

The Kingsland Road Works of The Gas Meter Company, Ltd.

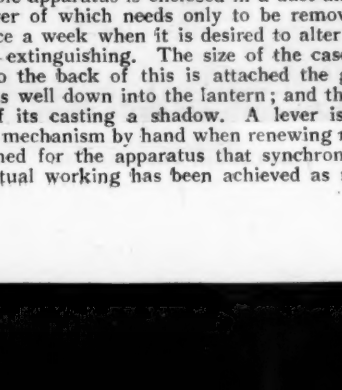
On Wednesday, Jan. 14, the Association paid a visit to the Kingsland Road Works of the Gas Meter Company. In spite of rain and thoroughly depressing weather conditions, a large gathering, numbering about 70 members, among whom one noticed Mr. G. M. Gill, assembled at the works at 2.30. They were welcomed, on behalf of the Directors of the Company, by Mr. A. J. West, the General Manager. He mentioned that two members of the Board were present—Mr. F. W. Church, who had been connected with the Company for over 48 years, and Mr. Franklin Thorp. The Kingsland Road Works, said Mr. West, were established in 1858 by Mr. Alexander Croll, who in early life was interested in the watch industry, and at one time was Engineer to the Great Central and the Surrey Consumers' Gas Companies, which were absorbed respectively by the Gas Light and Coke Company and the South Metropolitan Gas Company. Mr. West said that the work in the London factory was confined to the manufacture and repair of dry meters; wet meters being made at Oldham.

Tour of Inspection.

The visitors, divided into parties and conducted by members of the staff, then made a tour of the works. The assembling of gas meters from start to finish proved highly interesting. The men employed by the Company are highly-skilled craftsmen; and the rapidity and precision with which they accomplish their work is truly amazing. At each stage the meter is tested. An ingenious bubble arrangement, by which slight leakage can be readily detected, attracted considerable attention. The visitors were also able to see the various stages through which meters sent for repair pass. Attention was drawn to a specially-designed gas-fire meter for hotel and boarding-house use, with inlet on the right-hand side and connections at the bottom of the meter. This meter is also fitted with a turning-back arrangement which enables the hotel proprietor to close the valve by means of a key, should any prepaid gas be left unconsumed. A new feature shown to the visitors was a prepayment meter which can, by a slight adjustment *in situ*, be made to operate with pennies or shillings, or, if desired, can be converted into an ordinary meter.

The "London" Controller.

Another interesting exhibit was the "London" automatic controller for lighting and extinguishing public lamps. This is the result of many years' experience in automatic lighting, and



The "London" Clock Controller.

has now been in use in many districts for a number of years. Experience has enabled the Gas Meter Company to make many improvements in details of the mechanism.

Briefly the apparatus consists of a clock and gas-tap mechanism. The latter consists of a separate train of wheels which are released in readiness for action a short time before the predetermined time of action by means of a two-armed lever actuated by pins carried by the moving dial. The clock is fitted with a special lever escapement. The working of the apparatus is not affected should the lamp post and controller be out of the perpendicular; and special precautions have been taken in the latest pattern to prevent the possibility of gas leaking into the clock mechanism. Vibration cannot cause the controller to operate before the pre-determined time. When fixed in the lantern, the whole apparatus is enclosed in a dust and insect proof case the cover of which needs only to be removed for a few moments once a week when it is desired to alter the times for lighting and extinguishing. The size of the case is 3½ in. by 2 in., and to the back of this is attached the gas tap. The apparatus fits well down into the lantern; and there is thus no possibility of its casting a shadow. A lever is provided for working the mechanism by hand when renewing mantles.

It is claimed for the apparatus that synchronization of the clocks in actual working has been achieved as nearly as it is

possible to do so, this important essential of a clock controller being partly due to the apparatus being so constructed as to limit the work of the clock mechanism to keeping time only, and partly due to the construction of the dial, permitting practically perfect setting.

An important feature of the controller is the gas tap. This is operated by a second train of wheels independent of the clock mechanism, and is constructed so that the pilot light is automatically turned off when the burner is lighted up. The mechanism runs for some seconds during the operation of lighting or extinguishing, giving plenty of time for the burner to light before the pilot jet is extinguished. The formation of the tap obviates any chance of a shock being given to the mantle. A considerable saving of gas is effected by the extinguishing of the pilot light while the full flame is burning.

Several types of this ingenious appliance were shown in action, including one specially designed for shop lighting which will light and extinguish lamps on six days of the week, omitting Sunday. A controller operating a cluster, which will operate certain burners at predetermined times was also shown in action; and another pattern fitted with a fog attachment was on view.

Admiration was generally expressed by the visitors on seeing a beautifully-designed show meter, in a glass case, which was in operation. Every part of this meter, which was originally exhibited at the British Empire Exhibition, is delightfully finished.

After the inspection of the works, the company were entertained at tea. Thereafter,

Mr. W. L. WESTBROOK, Senior Vice-President of the Association, after saying how sorry Mr. Newton Booth was at being unable to be with them, expressed his appreciation of what had been a thoroughly enjoyable afternoon. He was interested in the new convertible meter, which, by a slight alteration, would function as a penny or a shilling prepayment meter, and could also be used as an ordinary one. It was a very ingenious arrangement. He well remembered the original prepayment attachment manufactured by the Gas Meter Company twenty-five years ago, and which in many cases was still in good working order. This spoke very well for the quality of the firm's work. The clock controllers exhibited were also highly interesting, and would be of great service to shopkeepers who liked to have their premises lighted after business hours. Such devices, too, had a distinct moral effect, making the public realise how the modern application of gas met their needs. They had to thank the Gas Meter Company for placing on the market a controller the reliability of which his own experience had proved.

Mr. A. BROADBENT, the Junior Vice-President, proposed a vote of thanks to the Directors of the Gas Meter Company, mentioning Mr. Franklin Thorp and Mr. F. W. Church, and also Mr. A. J. West (General Manager), and his assistants, who had acted so admirably as guides, and Mr. F. G. Cockey. Everyone had benefited by the visit, which had cleared up many points on which they had hitherto been rather hazy. He was impressed by the pleasing design of the new gas-fire meter, with its special connections. There was an increasing demand for this type of meter, which had certainly come to stay.

Mr. D. J. WINSLOW, of the Lea Bridge Gas Company, seconded the vote. There was always a fascination, he said, in visiting a gas meter works. To most gas consumers the meter was a "box of tricks"; and it behoved all juniors to take all opportunities of seeing the construction, so that if occasion arose they would be ready to explain the working parts. The Gas Meter Company had a fine record, and were keeping well up to the times.

Mr. W. J. LIBERTY, Secretary of the Institution of Public Lighting Engineers and Superintendents, and a Past-President of the Association, who supported the vote, said how pleased he was to meet again Mr. Franklin Thorp, than whom no man had worked harder to get the junior associations on a firm basis. Mr. Thorp and himself, in 1902 and 1903, had had a hard fight to obtain that recognition which was the juniors' due.

Mr. FRANKLIN THORP, replying, mentioned that he was proud of still being a member of the Manchester and District Junior Gas Association. As a matter of fact, he could claim to be the only trader who had been a President of a Junior Association. In the early days the juniors experienced great difficulty in getting recognition from the seniors; but headway was made after they had received the support of the late Mr. William Newbigging, whose help was an important factor in their success. Many eminent seniors of to-day had been members of junior associations. Mr. S. Tagg, of Preston, Mr. H. E. Bloor, of York, and Mr. S. E. Halliwell, of Bristol, had all been members of the Manchester Juniors. A gas engineer had to be a civil engineer, an electrical engineer, a chemist, a physicist, and many things besides; and very often the diplomatic side was as important as any. Mr. Thorp said that during the early part of his life he had been interested in the construction of spectroscopes and scientific instruments. He had made apparatus for Dewar's experiments on liquid air, and for Ramsay's work on argon and helium. He had the opportunity of coming into contact with great minds; but he was sure that no man had to be as versatile as a gas engineer, the general status of whom had been raised by the junior associations. Within recent years he had been round the world, and met many fine gas engineers in the Dominions. For the most part gas was sold there chiefly for lighting and cooking; but in places like Sydney there were opportunities for outside men to push the sales of gas for industrial purposes. Speaking of electricity and gas for lighting, Mr. Thorp said there were still very great possibilities for gas. It was a mistake to imagine that electricity had got the lighting field. After all, from the fundamental efficiency point of view of light sources, they had only touched the fringe. There was more in the gas meter industry than met the eye. It was essentially an industry in which experience counted for a great deal—in the manufacture of valves and leathers, for example. The past experience of the Gas Meter Company, coupled with the ingenuity of their engineers, and their go-ahead policy, should certainly result in the manufacture of first-class apparatus. He might say that, whatever the cut in prices, the firm were determined not to reduce the quality of their meters. He wished the London Juniors all success.

Mr. CHURCH, on behalf of the Chairman and Directors of the Company, briefly thanked the Association for the interest which had been taken in the visit.

Mr. COCKEY also expressed his gratification at the interest taken. The Company's works at Kingsland Road was really an assembling shop. The main works, where the more interesting processes were carried out, was in Oldham. The assembly of a gas meter was a highly skilled craft, and one in which experience counted for much—perhaps more than in any other trade. Many of their employees had been with them for a long period. Only recently a workman who had served the Company for 48 years expressed his regret on his retirement. Every meter manufactured by them was carefully examined in each stage, and finally underwent a severe test at the Standards Office. Since the original meter of Croll and Richards, many modifications had been introduced, but had not stood the test of time as had the sound construction of this meter. The old meters rated by lights were designed for the capacity stated, and if worked above this rating, their lives were shortened. In the new standard meter, however, larger connections and parts had been made, thus reducing friction, and allowing of a more ample margin. The new prepayment meter also worked more freely than did the old type. Considerable experimental and research work was being carried on in the gas-meter industry; and ultimately the gas industry got the benefit of this.

Mr. WEST, on behalf of himself and the staff, thanked the Association for the keen interest displayed, which constituted a great compliment.

A NEW GAS COOKER HOOD.

Our illustration shows a new hood for gas cookers, manufactured by Messrs. J. & W. Shale, East London Ironworks, Rhodeswell Road, Limehouse, London, E. 14. Constructed of galvanized iron sheet of substantial gauge, and fitted with a strong plate-rack, this improved hood should become very popular, and certainly is a desirable addition to any gas cooker. A trough or channel is fitted at the base of the hood, to collect condensation and facilitate cleaning.

While the discharge of the products of combustion and the odours of cooking does not matter in (say) a scullery, when the cooker is in a living room it is another matter. The new hood, which is inexpensive and does not encroach upon room space, is designed to meet this difficulty. It may be added that it has been approved by the London County Council.

Melting-Point of Coal Ash.—The first of two papers submitted earlier this month at a meeting of the Manchester Section of the Society of Chemical Industry described a continuation of work by Messrs. F. S. Sinnatt and N. Simpkin (in conjunction with Mr. A. B. Owles) in connection with determining the melting-point of coal ash. According to the authors, experiments showed that determinations performed in a reducing atmosphere gave very different results from those obtained in an oxidizing atmosphere; and in this respect a mixture of 50 p.ct. hydrogen and 50 p.ct. steam yielded the most pronounced effect, the melting-point being lowered in some cases by as much as 250° C. This is of importance, said the authors, in view of the fact that in certain industrial plants—*e.g.*, water gas plants—the coal during combustion is subjected to a reducing atmosphere. It becomes important, therefore, to determine, not merely the melting-point of an ash in air, but the lowest temperature at which an ash will melt as exemplified by a reducing atmosphere. It is common practice to blend coals for certain purposes, and an investigation has been carried-out upon the effect of blending coals from the point of view of the melting-point of the ash. Starting with two coals whose ashes melted at different temperatures, it has been shown that, by blending the coals in different proportions, the resulting ash may melt (*a*) either above the melting-point of both, (*b*) below both the melting-points, or (*c*) between the two melting-points.

GAS BILLS FOR 1925.

THE forthcoming Parliamentary Session promises to be a far more interesting one than the last, from a Gas Legislation point of view. The number of Bills, though not heavy as compared with years ago, is far greater than was the case in 1924; and there are some interesting proposals put forward. Foremost among these is the scheme for the amalgamation of the Gas Light and Coke Company and the Brentford Gas Company; and besides this there are the South Metropolitan Gas Company's Mutual Assistance Bill and the three Gas-Works Purchase Bills, which have also been reviewed in our columns.

The BARROW-IN-FURNESS CORPORATION seek various powers, and one part of the Bill relates to their gas, electricity, and water undertakings. They want power to sell, let on hire, and maintain all kinds of gas apparatus and fittings, including engines. Other clauses take power to provide showrooms and demonstrations and to make reasonable charges for stand-by supplies under the conditions set out in the Model Gas Bill. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The BEXHILL CORPORATION Bill is for the purpose of enabling the Corporation to purchase, by agreement or compulsorily, the undertaking of the Bexhill Water and Gas Company, and to supply gas and water within the Company's limits of supply. A review of the main provisions will be found on p. 83 of the "JOURNAL" for last week. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The BEDWELLTY URBAN DISTRICT COUNCIL Bill is a general measure, but it contains one clause relating to gas supply. By this the Council may sell and the Rhymney and Aber Gas Company may purchase, on such terms as may be mutually agreed, the whole or any part of the mains, pipes, and other apparatus used by the Council for the purpose of supplying gas in such part of the Rhymney Valley within the urban district of Gelligaer as is situate between the Abertwsswg Brook on the north and the Cefn Brithdir Colliery Pit on the south. Upon such sale and purchase being carried into effect, this part of the urban district of Gelligaer shall be excluded from the limits of the Council for the supply of gas as defined by section 48 (gas limits) of the Act of 1912, and shall be included within the limits for the supply of gas of the Rhymney and Aber Gas Company. [*Parliamentary Agents: Messrs. Lees & Co.*]

The BLACKPOOL CORPORATION are promoting an Improvement Bill. There are a number of gas clauses of an ordinary character, and that relating to freedom from obligation to supply for other than lighting or domestic purposes where mains are insufficient in capacity is included. The Corporation seek power to levy and recover such charges as they think fit for taking the reading of any gas or electricity meter fixed in a house which is either in whole or in part let furnished, at the request of, and for the convenience of, consumers, at times other than those of the periodical readings. It has been reported in our news columns that the following clauses were opposed when the Bill was submitted for approval to a Town's Meeting.

> *Tenant's Liability for Sub-Tenant's Gas Supply.*—Where any owner, lessee, or tenant lets or sub-lets any premises for a period not exceeding six months, such owner, lessee, or tenant may be required by the Corporation to pay the rents or sums due to the Corporation for meter rent and the hire of meter, stove, cooker, taps, fittings, or pipes due from the tenant or sub-tenant in like manner as if such owner, lessee, or tenant had retained possession of such premises and had not let or sub-let the same.
>
> *As to Offices and Showrooms.*—The Corporation may, in connection with, and for the purposes of, their gas and electricity undertakings respectively, fit-up showrooms and offices and exhibit specimen installations and give demonstrations of the uses to which gas or electricity can be put, and may appoint and pay persons for the purposes aforesaid.

[*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The BOLTON CORPORATION Bill is another general measure, containing a number of clauses of an ordinary character, conferring further powers upon them with regard to the supply of gas. They seek freedom from obligation to supply gas for other than lighting or domestic use where the capacity of the main is insufficient, and authority to require anti-fluctuators to be used with gas engines, as well as power to vary the price according to the purpose for which the gas is supplied. The stand-by clause is in the following terms:

> When any person has for the purposes of a stand-by only a supply of gas laid on by the Corporation to any premises for which he has at the same time a separate supply of electricity or gas for power or other purposes, the Corporation shall be entitled to charge and receive from him in respect of the supply of gas so laid on such minimum sum as shall be fixed by the Corporation not exceeding forty shillings for any one quarter of the year, notwithstanding that the ordinary charge for the gas actually consumed in such quarter would amount to a less sum. Provided that—(*a*) in fixing the amount of such minimum charge the Corporation shall have regard to the probable maximum supply of gas which might at any time be required for such premises; and (*b*) no such minimum sum as aforesaid shall be fixed in the case of any premises in respect of which gas is supplied by the Corporation only through a meter of not greater capacity than a No. 3 standard meter or a meter having a nominal capacity of less than ten lights.

[*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

In the BURNLEY CORPORATION Bill, also, there are a number of gas clauses, among the various other matters dealt with. The Corporation desire authority to adopt the Sale of Gas Acts, 1859 and 1860; to appoint an inspector or inspectors of gas meters; and to provide and maintain at their gas-works a station, with all necessary apparatus, for testing such meters. There is a "powers as to residual products" clause in the terms of the Model Bill, except for a slight variation in the opening lines, which read: "The Corporation may (*a*) purchase the residual products arising from the manufacture of gas by other gas undertakers and therewith, on any lands upon which they are for the time being authorized to manufacture gas or work-up and convert residual products, manufacture other products of the same kind as the Corporation are manufacturing from their own residual products." The stand-by clause is in the following terms:

> Notwithstanding anything contained in the Gas-Works Clauses Act, 1871, or any other Act, a person shall not be entitled to demand or continue to receive for the purposes of a stand-by supply only from the Corporation a supply of gas for any premises (other than a dwelling house) having a separate supply of gas or a supply (in use or ready for use for the purposes for which the stand-by supply of gas is required) of electricity, steam, or other form of energy, unless he has agreed to pay to the Corporation such minimum annual sum as will give them a reasonable return on the capital expenditure incurred by them in providing such stand-by supply and will cover other standing charges incurred by them in order to meet the possible maximum demand for those premises, and the sum so to be paid shall be determined in default of agreement by arbitration in manner provided by the Arbitration Act, 1889.

The Corporation are desirous that, in its application to their gas undertaking, section 20 of the Gas-Works Clauses Act, 1847, should have effect as if the words "ten pounds" were inserted therein instead of the words "five pounds." The section in the 1847 Act reads:

> 20. *Satisfaction for Accidentally Damaging Pipes.*—Every person who shall carelessly or accidentally break, throw down, or damage any pipe, pillar or lamp belonging to the undertakers, or under their control, shall pay such sum of money by way of satisfaction to the undertakers for the damage done, not exceeding five pounds, as any two Justices or the Sheriff shall think reasonable.

A further part of the Bill relates to the sale of coke. The Corporation are desirous that where any coke sold or represented to be sold by weight, and exceeding 2 cwt. in quantity, is delivered by means of any vehicle to a purchaser, the seller of such coke shall deliver or cause to be delivered or to be sent by post or otherwise to the purchaser or to his servant before such load is discharged a ticket or note as nearly as may be according to the form in the Weights and Measures Act, 1889, or according to a form to the like effect. If there is default in complying with the section, or if the quantity of coke delivered is less than that stated on the ticket, there shall be a penalty not exceeding five pounds. Any purchaser of a quantity of coke exceeding 2 cwt., and any inspector of weights and measures or other officer appointed by the Corporation, may require that such coke shall be weighed or re-weighed, under certain conditions, and obstruction of this weighing or re-weighing shall render the person concerned liable to a penalty not exceeding five pounds. For the protection of smaller consumers, every person offering for sale from any vehicle coke in a quantity exceeding 14 lbs. but not over 2 cwt. shall offer it in sacks with a metal label affixed to the top of each indicating the correct legal weight or measure of coke therein; and the name and address of the seller of the coke are to be conspicuously painted upon the vehicle. Provision is made for weighing or measuring as in the case of larger quantities. Wilful damping is referred to in the following clause:

> If the seller of coke or any person in charge of any vehicle from which coke is being sold, or offered, or exposed for sale wilfully makes any false statement as to the weight of the coke in any sack or wilfully increases such weight by damping such coke, or wilfully does any other act by which the purchaser of the coke shall be defrauded, or fails to comply with the other provisions of this section, or obstructs any weighing or re-weighing or measuring or re-measuring authorized by this section, he shall be liable for every such offence to a penalty not exceeding five pounds.

The Corporation are wishful to make alterations in the boundary of the borough, and to include therein certain areas which at present form part of the Padiham urban district and the Burnley rural district respectively, and that their limits for the supply of gas shall be extended so as to embrace the added part of Padiham, the added part of Ightenhill, and the added part of Habergham Eaves. In connection with this extension, the Corporation will purchase from the Padiham Urban District Council all gas mains, pipes, and other works belong-

ing to them and situate within the added part of Padiham, at a price to be agreed upon or determined by arbitration. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The GAS LIGHT AND COKE COMPANY'S Bill for the transfer to them of the undertaking of the Brentford Gas Company, to authorize the conversion of 10 p.ct. bonds into a proportionate capital sum of 3 p.ct. consolidated debenture stock, and for other purposes, was noticed at length on pp. 30-31 of the "JOURNAL" for the 7th inst. [*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

The HORLEY DISTRICT GAS COMPANY are promoting a Bill to empower them to supply electricity jointly with their gas undertaking, for public and private purposes, within so much of their limits as is not included in the area of supply of the Sussex Electricity Supply Company, Ltd., as is defined by the Crawley and District Electricity Special Order, 1924, and to raise additional capital for the purpose. The clauses provide that on part of the land on which they are now authorized to manufacture gas they may erect and use a station, works, and buildings for the generation, transformation, and distribution of electrical energy, and for making, working-up, converting, and storing any materials or residual products resulting from, or used in, the generation of electricity by them; but the section shall not relieve them from the necessity of obtaining the consent of the Electricity Commissioners to the establishment of a new, or the extension of an existing, generating station. The Company are to be specially authorized to break-up the streets or parts of streets not repairable by the local authority and the railway which are mentioned in a schedule; and they shall within a period of two years after the passing of the Act lay down suitable and sufficient distributing mains for the purposes of general supply throughout the streets and parts of streets mentioned in another schedule. Subject to alteration in accordance with the provisions to the schedule to the Electricity (Supply) Act, 1922, the maximum prices which may be charged by the Company are—(*a*) in respect of the quarters ending March 31 and December 31, for any amount up to 15 units 12s. 6d., and for each unit over 15 units 10d.; and (*b*) in respect of the quarters ending June 30 and September 30, for any amount up to 10 units 8s. 4d., and for each unit over 10 units 10d. The additional capital which the Company may raise is placed at £30,000, with borrowing powers equal to one-half of the paid-up capital of the Company for the time being. Separate capital and revenue accounts are to be kept of the gas undertaking and the electricity undertaking; and the Company shall, out of the capital raised under this Act, carry to the capital account of the gas undertaking a fair proportion of the value of all land and buildings acquired or erected for the purposes of that undertaking and used also for the purposes of the electricity undertaking. The expenses of direction and management and others common to both undertakings shall also be apportioned between the separate accounts. It is sought to change the name of the Company to the Horley District Gas and Electricity Company. [*Parliamentary Agents: Messrs. R. W. Cooper & Sons.*]

The HOYLAKE AND WEST KIRBY URBAN DISTRICT COUNCIL Bill is for the purpose of carrying into effect an agreement for the transfer to the Council of the undertaking of the Hoylake and West Kirby Gas and Water Company. The main provisions have already been set out on p. 83 of last week's "JOURNAL." [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The MANSFIELD CORPORATION include in a big general Bill the clause already referred to in connection with various other measures, to the effect that: "Notwithstanding anything in any enactment to the contrary, the Corporation shall not be obliged to give from any main a supply of gas for any purpose other than lighting or domestic use in any case where the capacity of such main is insufficient for such purpose or if, and so long as, any such supply would, in the opinion of the Corporation, interfere with the sufficiency of the gas required to be supplied by means of such main for lighting or domestic purposes." [*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

The OLDHAM CORPORATION are also promoting a heavy Bill, dealing mainly with tramways, trolley vehicles, and omnibuses. Various other matters are, however, introduced, and among these is a part relating to the gas undertaking. The Corporation are desirous of having inserted in the Act a number of clauses on general lines regulating the supply of gas. There is a clause to enable them to make charges giving a reasonable return for stand-by supplies, and another regarding the provision of a valve where high-pressure air is used. Authority is asked for to supply power gas; the clauses in this connection being similar to those already noticed when reviewing the Gas Light and Coke Company's Bill on p. 30 of this volume. Power is sought to vary the price according to the purpose for which gas is supplied, and also "to purchase or take on lease and maintain houses and buildings for persons in their employment in connection with the gas undertaking, and offices, showrooms, and other buildings for the purposes of that undertaking." [*Parliamentary Agents: Messrs. Sherwood & Co.*]

(To be continued.)

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Members of the Association paid a visit to the National Gas Engine Company's works, Ashton-under-Lyne, last Wednesday. The party were received by Messrs. W. Wood (Works Manager), W. Oakden, E. Balmford, E. Hallsworth, and J. Hall, Department Managers, who, along with several members of the staff, also acted as guides.

The National Gas Engine Company may be taken as a remarkable example of the advantages obtained by specialization in one branch of engineering. Founded in 1889 by Mr. H. N. Bickerton, J.P., the Company began business in a small way, with the object of supplying gas engines and suction gas plants to the works and factories in the neighbourhood. The firm very soon acquired a business far greater than the supply of local needs, and it has grown with the years to be one of the largest concerns of the kind in the world. Not only are the practical and commercial sides of the business carefully watched, but the scientific side of the work receives special attention; the latter being particularly under the supervision of Sir Dugald Clerk, K.B.E., D.Sc., F.R.S., M.Inst.C.E., F.C.S., the eminent engineer, who is a Director of the Company, and has been associated with gas-engine research from its infancy.

The main offices have a fine three-storey front facing the road, and include board room, telephone exchange, &c. There is a very fine laboratory for the testing of the metals used in every-day work; the staff being constantly engaged in research, seeking out new materials or trying fresh methods of treatment. There are two cupolas served by an electric hoist in the foundry, which is comprised of three bays, and adjoins the railway siding on which is a 5-ton travelling crane—the pig iron being lifted by means of an electro-magnet suspended in the crane hook.

The firm keep a record of every engine, and regard it as an obligation to supply new parts when required. They keep a large stock of spares, even for engines of the oldest types. At one end of the works is installed a Mond gas plant and sulphate of ammonia recovery and tar dehydrating apparatus. The Company employ about 2000 men, and give close attention to their welfare. There is a large canteen, and grounds are laid out for cricket, football, bowling, and tennis. Engines are made of all powers and suitable for working with various fuels, and in size go up to 2000 H.P.

After viewing the works, the members adjourned to the canteen for tea, after which Mr. H. N. Holton (Manchester) moved a vote of thanks to the Directors for their kindness in permitting the visit to the works. They appreciated the kindness very highly, and also the hospitality received, and the valuable information that had been furnished by the respective guides. Mr. Melling (Radcliffe) seconded, and also complimented the guides on the information furnished. Mr. Wood, on behalf of the Directors, said it gave them pleasure to entertain the members and show them round the works. He apologized for the absence of the Directors, four of whom were away in London, while the Chairman was ill. He thought that the gas engine was second to none as a prime mover, and that every consideration should be given to the town gas engine. Mr. Hallsworth supported, and said they could easily compete with the electricity people if the gas undertakings would assist them by favourable prices for gas. A number of gas companies were buying gas engines and selling them to their consumers, and they as a firm were prepared to take back any of their engines that had been installed, in the event of their being thrown on the hands of the gas company within a period of three years, and to credit the gas company with the account paid, less the sum received by the gas company from the consumer.

The following paper was then read:

SOME NOTES ON GAS-WORKS PRACTICE.

By A. COOK, of Warrington.

My main object in bringing these notes on gas-works practice before this Association is to encourage discussion by the new members on the subjects in which they are most interested. I have carefully avoided going into much detail, as this would be unwise in a paper of the above title.

First of all, let us consider the ever-present problem of selecting fuel for carbonization in both horizontal and vertical retorts. It has frequently been stated that, from the point of view of handling, any class of fuel can be carbonized in horizontal retorts, but that a very careful selection is necessary in the case of vertical retorts, nuts being first favourite. I intend to show that a through coal can be successfully dealt with in verticals without much trouble in the form of sticking charges, or reduced throughput per retort.

The vertical installation at our Longford Works is of the Woodall-Duckham type, the plant consisting of 16 retorts of 7 tons each, of a nominal capacity of 1¼ million c.ft. per diem. The actual make has reached 1½ millions, and the present average is between 1,300,000 and 1,400,000 c.ft., with all retorts in action. The quality of the gas is 500 B.Th.U. per c.ft. The first

retort was charged with coal on Aug. 21, 1922; a high-grade coal being used for the first few days. The actual fuel carbonized on the verticals for the year ended March 31, 1924, was as follows:

—	P.Ct.
Screened coal	20·4
Through coal	45·4
Nuts and beans	27·2
Slack	7·0

The average size of the above fuel was as follows:

TABLE I.

P.Ct.	On 1 in.	1 in. to ¾ in.	¾ in. to ½ in.	½ in. to ⅜ in.	⅜ in. to ¼ in.	Through ¼ in.
Screened coal	78·40	6·20	5 80	1·70	3·40	4·50
Through coal	41 70	7·60	10·40	4·50	11·80	24·00
Nuts and beans	1·40	14·05	36·25	12·00	24·05	12·25
Slack	5·35	11·85	15·30	5·90	16·60	45·00

These figures were obtained by screening the usual monthly samples taken for laboratory tests. The main results were: 60 to 65 therms, 13·2 gallons of tar, 25·4 gallons of liquor, and 9·2 cwt. of saleable coke per ton. I would point out, however, that for six months of the year we are obliged to have a few beds at work in the old horizontal retort house. In this house we have two Fiddes-Aldridge stoking machines, and the size of the retorts is 22 in. by 16 in. by 20 ft. long. With retorts of this size, it is impossible to get full charges and high heats with the machines at our disposal.

The figures quoted may seem very modest when compared with the 70 to 90 therms per ton we read about sometimes; but is it worth while to pay 4s. to 5s. per ton more for a higher-grade fuel unless a satisfactory return is obtained in the form of gaseous therms? This brings me to the subject of the purchasing of fuel. Whatever tests are taken in the laboratory or on the working scale, or both, should be read in conjunction with the financial balance-sheet. I think this is admitted by most, if not all, gas engineers; but the question I wish to bring forward is this: What is the best way of arriving at a suitable standard method for the valuation of fuels? At Warrington, we make a practice of testing each contract coal every month in addition to any other special test wagons which may come along. Of the carefully-sampled fuel 2·24 lbs. are put through the test plant, and the data obtained are shown in the table below, where three classes of fuel are given, "A" being screened coal, "B" nuts, and "C" slack.

TABLE II.

Coll. and Seam.	Supplied by.	Wagon No.	Date Received.	Date Tested.	Make per Ton, C.Ft.	C.V. of Gas, B.Th.U.	Therms per Ton.	C.V. of Fuel (Dry Sample).	Coke per Ton. Cwt.	Ash in Coke P.Ct.
A.	F.M.	1291	31/ 8/23	31/ 8/23	11,500	640	73·6	14,130	12·8	11·2
B.	W.R.	24	21/ 8/23	22/ 8/23	10,400	657	68·3	12,960	12·[illegible]	6·4
C.	R.P.	476	16/11/23	18/11/23	11,400	56·	63 8	13,680	12·[illegible]	[illegible]6 71

To arrive at the test value of each fuel, let us take the gas at 3d. per therm, and the coke *less* ash at 1s. 6d. per cwt. Take the case of sample "A."

	s.	d.
73·6 therms at 3d. =	18	5
12·8 cwt. of coke *less* 11·2 p.ct. of ash = 11·4 cwt. at 1s. 6d.	17	1
Total test value	35	6

The three samples above would show the following results:

TABLE III.

	Gas.	Coke.	Total Value	Price of Fuel.	Difference.
	s. d.	s. d.	s. d.	s. d.	s. d.
A.	18 5	17 1	35 6	25 3	10 3
B.	17 1	15 11	33 0	24 6	8 6
C.	15 11	16 1	32 0	18 9	13 3

In addition to the above tests, a close watch is kept on the wagons of fuel as they arrive; and should a certain quality be suspected of being below the usual standard, a wagon is kept back, a careful sample taken, and a proximate analysis made.

Coming back to vertical retort practice, I find it pays to clean all flues periodically. This is done every three months; the waste-heat boiler being also put off, and the tubes cleaned and washed out with lime water. When the waste-heat boiler is in action, hourly observations are taken, as shown in Table IV.

During the summer months, the top men complained of excessive heat from the settings. With a view to improving the conditions, we went into the question of installing a fan with suitable mains to serve the hottest parts of the top floor. We came to the conclusion that it would not pay to instal plant of this description, at any rate in our case, as the building is exposed to the prevailing winds and it is only when the weather is sultry that the temperature is excessive. Daily observations were taken—temperatures at various points, directions of wind, &c. We carried out experiments with insulated bricks, and found that by laying these on the top of the settings, with an air space between them and the settings, a reduction of 20° Fahr. was effected. The top castings were also lined with insulating bricks.

TABLE IV.—*Waste Heat Boiler.* *Date.....*

Time.	Pull in Tenths.			Temperature.		Steam Pressure.	Water Level.	Meter Index.	Water Used.
	Boiler Inlet.	Main Flue.	Fan Inlet.	Fan Inlet.	Water Inlet.				
a.m.				Fahr.	Fahr.	Lbs.			Gallons.
6	10	5	17	445°	175°	95	13	85720	220
7	10	5	17	445°	175°	90	13	85960	240
&c.									

A useful practice in retort house work is to keep a log book in charge of the shift foreman. Various items of interest are entered up, including scurfing, patching, breakdowns, &c. The carburetted water gas plant is kept in readiness in case of emergency, and is used chiefly as an auxiliary.

The method we adopt of testing pitch may be of interest to many members. Sticks of the sample of pitch are made 6 in. long and ½ in. square in section. The casting for making these is shown in the rough sketch, fig. 1. It is made in two similar

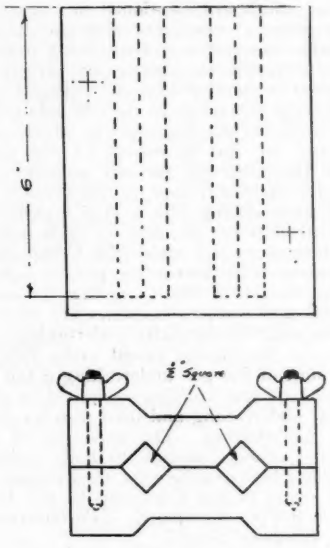


Fig. 1.

pieces, and the two are screwed together tightly by means of thumbscrews. The pitch is melted and run into the moulds. On solidifying, the sticks are removed, and two pieces 2 in. long are carefully cut off, and two pieces ½ in. long. The 2 in. lengths are used for the determination of the twisting point, and the ½ in. cubes for the melting point.

Melting Point Test.—The cubes are suspended separately in a beaker of water by means of wire heated in a bunsen flame and forced into the centre of the cubes. A thermometer is also suspended in the water in such a way that the bulb is almost touching the cubes of pitch. The temperature of the water is increased at the rate of about 2° per minute, and the temperature at which the cube leaves the wire and touches the bottom of the beaker is taken as the melting point.

Twisting Point Test.—The 2-in. sticks are suspended in water alongside the thermometer, and the water heated just sufficiently to make the sticks pliable to the fingers. The source of heat is now removed, and the water allowed to cool. As this cooling is proceeding, the sticks are taken out in turn and twisted by hand a quarter of a turn and back. This operation is performed as quickly as possible, and the stick placed back in the water. At the commencement of the test it will usually be found sufficient to twist one of the sticks at every 2° C. fall in temperature, but as the temperature falls to within a few degrees of the twisting point, it is advisable to test the sticks at each degree fall.

The temperature at which the stick snaps in two is taken as the twisting point. At present we are making a medium hard pitch having a melting point of 88° C. and a twisting point of 55° C., this quality being the most suitable for our customers.

The dehydrated tar we are at present making is to the Road Board Specification No. 1. While on this subject, I might mention that we successfully use dehydrated tar for coating the telpher track.

TESTING STEAM-RAISING PLANT.

The manufacture of sulphate of ammonia has been dealt with at length in past contributions to the Technical Press; and as

time will not allow me to go into this part of works practice, I pass on to my next subject, the testing of steam-raising plant. Most small and medium sized works are not in a position to purchase expensive apparatus for carrying out evaporation tests and arriving at the best method of firing a Lancashire boiler. Another factor to be considered is the time at the disposal of the technical staff. If a reasonably large tank is available for the feed water, it is possible to work for three or four hours with the water supply to the tank shut off. The tank can then be filled up and further observations taken. The fuel we mostly use is unscreened breeze, but recently we carried out experiments with a mixture of coke dust and slack, with a view to finding a market for our dust obtained by the screening of the unscreened breeze. Eight-hour tests were taken; and the following is a brief summary of the results.

No. 1 test is unscreened breeze, and No. 2 a mixture of slack and coke dust:

—	Test No. 1.	Test No. 2.
Average steam pressure.	81·3 lbs.	71·5 lbs.
Feed water temperature	149° Fahr.	125° Fahr.
Economizer outlet . .	180° Fahr.	193° Fahr.
Water evaporated . .	851 gallons per hour	828 gallons per hour
Evaporation (actual) .	6·03 lbs. per lb. of dry fuel	6·47 lbs. per lb. of dry fuel
Fuel used (two boilers) .	5 tons 6 cwt.	Tons Cwt. 2 1 slack 2 13 dust 4 14 total
Clinker.	1 ton 4 cwt. = 23·57 p.ct. of fuel used	12½ cwt. = 13·3 p.ct. of fuel used
Analysis of fuel—		
Moisture	4·90 p.ct.	1·95 p.ct.
Ash (dry basis). . .	21·77 p.ct.	18·10 p.ct.
C.V.	11,520 B.Th.U.	11,160 B.Th.U.

IMPROVISED PILING.

Some time ago we experienced trouble owing to the office foundations giving way somewhat, causing large cracks in the walls. We had not much headroom for pile driving in the ordinary sense of the term, and probably our method of overcoming the difficulty (see fig. 2) will be of interest to many members.

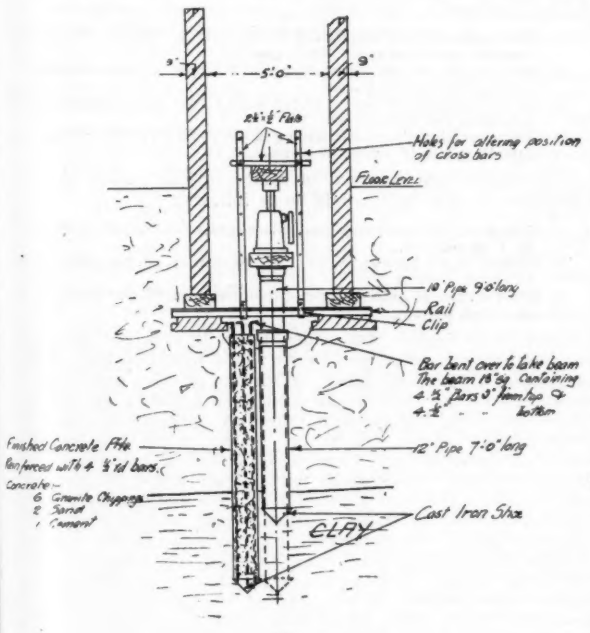


Fig. 2.

Only one section is described, all others being carried out in a similar manner. The ground was excavated for about 3 or 4 ft., and two old railway metals placed under the footings of the walls. To these were bolted four 2½ in. by ½ in. flats by means of clips. A 12-in. cast-iron pipe, having a cast-iron shoe at the spigot end, was driven down by means of a 5-ton hydraulic jack. The depth of the clay from floor level was about 10 to 12 ft. A 10-in. pipe was then driven down inside the 12-in. until the cast-iron shoe was forced well into the clay. The reinforcement was then placed inside the 10-in. pipe. This consisted of four bars ½ in. round section, with four rings equally spaced. The concrete was then thrown in, a few buckets at a time, and rammed; the 10-in. pipe being raised slowly after each ramming, by means of pulley blocks. After raising the 12-in. pipe in the same way, the reinforcement bars were bent over at the top, so as to form part of the beam over the piles. This beam was 18 in. square, containing four ½-in. bars placed at the bottom, and four placed 3 in. from the top. The concrete was composed of six parts of granite chippings, two parts of sand, and one part of cement.

AMBULANCE EQUIPMENT.

Some time ago I was asked to organize a works ambulance class. Sixteen men came forward and expressed a desire to join. A doctor was engaged to deliver a course of lectures; and at the end of the session fifteen candidates were examined by the St. John Ambulance Association, and out of this number thirteen were successful. Ten passed for First Aid Certificates, two for Voucher, and one for Label.

In June last, eleven candidates sat, all of whom passed—eight for Voucher, two for Medallion, and one for Label. This year we have taken on seven new members, and have engaged a doctor to lecture the class. We have now a full ambulance equipment, including stretcher, portable oxygen apparatus, and breathing apparatus. We have always at least one ambulance man on each shift. The breathing apparatus is used very successfully during the cleaning-out of light oil storage tanks, &c. In addition to this being a safety-first appliance, it has proved a source of economy, as a tank is cleaned out, all naphthalene salts, &c., being removed, in one day, compared with over two days previously. By this means, the man inside the tank is able to work in comfort, and receives a good supply of fresh air, which is supplied by a pair of bellows worked by a man outside. In my opinion, no medium-sized or large works can afford to be without an ambulance class. Even small works might with advantage send two or three men to attend such a class elsewhere if they are not in a position to organize their own class. At any rate it contributes to the human side of the industry.

PHOTOGRAPHY IN GAS-WORKS PRACTICE.

Anyone interested in photography, especially works chemists, might adapt their hobby to further the interests of the undertaking they serve. This can be accomplished in many ways—by keeping photographic records of plant in course of construction, main laying, &c., on the district, or the making of lantern slides for lecture purposes. It is my intention at some future date to make such a set of slides for the purpose of giving a lecture to our consumers on the manufacture and distribution of gas. In these days of keen competition, it behoves all interested in this great industry of ours to keep the subject of gas ever before the public. Though the gas industry is over a century old, one is really surprised at the amount of ignorance shown by the average lay mind on matters relating to gas and its application.

DISTRIBUTION.

Mains and services should be sufficiently large to meet district demands. The extent to which gas undertakings are justified in extending mains and service pipes is a most important question. Conditions vary largely, and set rules are impossible. At present, progressive undertakings extend and enlarge mains considerably, according to anticipated consumption; and service pipes are laid free to at least 30 ft. through private land. Immediate financial consideration should not be the chief factor, as a consumer acquired eventually means other consumers in the vicinity. The extension of mains to outlying districts is invariably followed by an extension of property. The number of consumers per mile of main during the last few years has decreased considerably, due to less congested areas, but this is counterbalanced by the increased demand for gas for cooking, washing, and heating purposes—that is, though the number of consumers per mile of main is less than formerly, the increased revenue per consumer is such that it pays for interest and sinking fund charges on the main. In short, gas undertakings must adopt a generous policy of main and service laying.

Mainlaying operations should be extended to both sides of a street, if at all practicable, and the mains should circuit, instead of finishing at a dead end. Circulation and equal distribution of gas more than compensate the extra cost involved. For example, a broken portion of a main can be sealed off, leaving a supply available for both sides. Considerable loss of consumption of gas for lighting is due to haphazard methods adopted. Frequently insufficient attention is paid to the adoption of the best burners, globes, &c., with fatal results. The keynote is technical supervision and the use of materials manufactured by firms of repute. The same remarks apply to cookers, fires, &c. Correct ventilation is one of the main factors coupled with correct size and adjustment. Great strides have been made recently, and experience is proving that radiated heat is always preferred to convected heat. Apparatus manufacturers, to whom we owe a great deal, will probably turn their attention to more combined apparatus—for example, the use of waste heat.

CONSUMERS' REQUIREMENTS.

My own experience as regards consumers' requirements is that the work of this section should be organized for dealing expeditiously with consumers' requests, which should be dealt with in order of urgency—for example, escapes, "no lights," and fitting work. In Warrington a card system is in operation, by which the work is divided into districts. This classification facilitates control and observation. Defects are immediately localized and remedied. In these competitive days, a consumer must have a good and reliable supply of gas, and must be assisted in procuring the most economical apparatus, at the same time being able to get acquainted with comparative costs.

In this way we have a thoroughly satisfied consumer, which is an asset for the retention and expansion of business. The price of gas, which is one of the main factors, must be as low as possible. In Warrington, the price to the general body of consumers is 2s. 10d. per 1000 c.ft., with special discounts to large consumers. This low figure is quickly increasing the demand; and applications for additional apparatus are being made, rendering the position such that the time is not far distant when capital will have to be employed not only in works extension, but at points of consumption. Extensions must be carried out at all times with an economic viewpoint. In this way standing charges are reduced considerably. One of the chief points in the success of a gas undertaking is that the gas supply knowledge of every employee connected with the distribution department be thoroughly sound. Thus the staff will become practical. This can be attained by arranging a series of lectures touching such subjects as appliances, tact in dealing with consumers' requests and complaints, &c. The education of the consumers must also be attended to. An up-to-date showroom in the main thoroughfare, with the latest approved apparatus on view, constitutes the best form of publicity.

Discussion.

Mr. J. H. CLEGG (Burnley) complimented the author on his paper, which showed how wide were the duties of a gas engineer. He thought the coals should be subjected to a quick and ready test, which should be carried out before the coal had been used. It was almost valueless to deal with the matter several days after the coal had been carbonized. He complimented Warrington on their ambulance classes, and asked if the Corporation had borne all expenses of the formation and instruction.

Mr. W. BUCKLEY (Manchester) remarked upon the ash in coke, 16·71 p.ct., and thought it obviously poor coal. Further, 7 p.ct. in slack seemed low for verticals. He could get the ash content in washed slack as low as 5 p.ct. Coal which had a high ash content was not of much value, and a better-class coal was to be preferred at all times.

Mr. H. J. HAILSTONE (Rochdale) spoke of the small coal crushing and sampling apparatus which would give in one hour a test that would compare favourably with actual works results. He also spoke about the electrical method of testing coal samples, and mentioned that the standard method of testing pitch should be strictly adhered to.

Mr. R. PRINCE (Heywood) asked if their test plant was coke fired or gas fired. Speaking of slacks, he mentioned that they had used 20 p.ct.; but if over this proportion was employed, the throughput had to be reduced.

Mr. C. H. BAMBER (Bolton) made reference to the Lessing coking test, which they carried out regularly at Bolton, and found very reliable. They had now isolated one vertical retort from the main setting, and erected a test plant complete with washing, scrubbing, and purifying apparatus. The exhauster drew its own gas from the 5-ton retort. In this way any class of coal could be tested, and would give a direct comparison with the full working results obtained with any grade of coal.

Mr. HALLSWORTH (Ashton-under-Lyne) said a showroom was not complete without a gas engine on view.

The PRESIDENT (Mr. H. E. Stone) said that verticals did not lend themselves to slacks in like manner to horizontals. He hoped, however, that when their verticals were in operation they would be able to deal with a higher percentage of slacks, by using higher heats and silica retorts. He was in favour of test plants dealing with a fair quantity of coal. As regards the ash content in coal, he soon stopped delivery of coal when this was on the increase. As to concessions to consumers, there was a limit in this respect, and regard must be paid to the effect on revenue.

Mr. J. ROBINSON (Altrincham), speaking about showrooms, suggested that stoves and other apparatus should be sold outright; the gas company being content with a small margin of profit, and stocking first-class goods which ensured no complaints. He found that simple hire was not a paying or desirable side of the business.

Mr. COOK, in reply, said they took their sample before the wagon was tipped; and if any doubt existed, the wagon was kept back. A wagon was taken at random from a train-load. Pitch should be tested at least once a week; and they had a working agreement with their customers as regarded the method of testing. The Corporation paid all the cost of their ambulance classes. The figures he had given under the various heads were not the highest they had obtained, but were a fair average. He was in favour of the Bolton method of testing coal by an actual retort being laid aside.

The author was heartily thanked for his very interesting contribution.

SCOTTISH JUNIOR GAS ASSOCIATION.

Joint Meeting.

The Eastern and Western Juniors held a joint meeting on Saturday, January 17, in the Royal Technical College, Glasgow.

Mr. JOHN M'ISAAC, President of the Western District, was in the chair, and was supported by Mr. R. L. Laing, Brechin (President of the Eastern District), and Mr. James Brown, of Glasgow.

Mr. M'ISAAC expressed his pleasure at the large attendance, and cordially welcomed the Eastern members to Glasgow. He also conveyed to Mr. W. A. Dearden the congratulations of the West on his new appointment as Engineer and Manager at the Johnstone Gas-Works.

The HON. SECRETARY intimated that the next ordinary meeting would be held on Feb. 7, instead of Feb. 14.

Mr. M'ISAAC then called on Mr. Brown to read his paper on

INDUSTRIAL PROBLEMS.

Gas undertakings have been successful in meeting all the requirements of the domestic consumer for lighting, cooking, and heating; yet the use of gas in the industrial field has not developed to the same extent, though steady progress is being made. To unsettled trade conditions can be attributed a temporary lull in progress, but future prospects indicate promise of an increase in the opportunities for the application of gas as a fuel, to many processes not yet tried. The high efficiency attained by present-day gas-fired appliances, and the specialized service gas undertakings are offering to guide and advise the manufacturer on the suitability of gaseous fuel for his specific requirements, provide the keynote to sure progress.

Much subject matter has appeared lately in the Technical Press on the qualifications of the industrial heating salesman, but I venture to state briefly a few points which are of special interest to those who contemplate becoming heating specialists. The industrial heating specialist must have a general knowledge of gas distribution, make himself conversant with all methods of heat operations, and be able to discuss the advantages and disadvantages of different fuels available. He should be well versed in the fundamentals underlying each operation under discussion.

From the numerous heating propositions which have come under my supervision, shipbuilding and engineering offer the greatest possibilities for the near future, and provide unlimited heating problems for solution. In actual practice we find many applications of heat treatment; forging, annealing, case-hardening, hardening, tempering, and rivet heating being the most common. When recommending gas furnaces for any of the foregoing processes, it is essential that all data relative to other fuels should be committed to memory. Gas as a fuel may seem dearer than some fuels if calculated on B.Th.U. values, but there are many advantages to be gained which will more than compensate for the difference in cost. For some idea of what fuel cost represents, the following gives a brief summary of each fuel, including the relation one bears to the other, and the B.Th.U. values.

(1) **Coal at 32s. 6d. per ton having 13,750 B.Th.U. per lb. = approximately 29 c.ft. of 470 B.Th.U. gas.**
(2) **Coke at 30s. per ton having 12,750 B.Th.U. per lb. = approximately 27 c.ft. of 470 B.Th.U. gas.**
(3) **Oil at 6d. per gallon having 17,500 B.Th.U. per lb. = approximately 37 c.ft. of 470 B.Th.U. gas.**
(4) **Gas at 2s. 6d. per 1000 c.ft. having 16,500 B.Th.U. per lb. = approximately 33 c.ft. of 470 B.Th.U. gas.**

The relative cost per cwt. of solid and liquid fuel, and the equivalent in cubic feet, would be as follows:

(1) **Coal at 1s. 7½d. per cwt. = 3248 c.ft. of gas at 2s. 6d. per 1000 c.ft. = 8s. 1·4d. per cwt.**
(2) **Coke at 1s. 6d. per cwt. = 3024 c.ft. of gas at 2s. 6d. per 1000 c.ft. = 7s. 6·72d. per cwt.**
(3) **Oil at 6s. per 12 gallons = 3696 c.ft. of gas at 2s. 6d. per 1000 c.ft. = 9s. 2·88d. per cwt.**

From these figures you would naturally conclude that gas was, according to price, prohibitive; so it would be if its many advantages did not hold good. With coal or coke, only a small percentage of the available heat units is utilized; the greater percentage being lost through imperfect combustion, ash, and losses in flue gases. A further oncost is entailed through labour charges, storage, removal of ashes, and heavy maintenance charges. The results with oil are much the same as with gas; but cleanliness, reliability, even temperatures, constant fuel values, no labour charges, saving in floor space, and increased output with corresponding excellence in the finished product, all tend to show a saving—in many cases up to 50 p.ct.—in favour of gas. Taking a concrete example to illustrate the relative costs between oil and gas for rivet heating in one of the leading shipbuilding yards, both appliances doing the same class of work, and under the same conditions, the following will prove the efficiency of the gas furnace.

Oil Furnace working 7 hours per day.

Fuel consumption, 35 gallons per day = 5 gallons per hour.
Rivets heated, 1434 per day = average 204 per hour.
Size of rivets heated throughout ⅞ in. by 2½ in. long.
Cost per day (excluding labour charges) at 4½d. per gallon = 13s. 1½d.

Gas Furnace working 7½ hours per day.

Gas consumption, 3500 c.ft. per day = average 466 c.ft. per hour.
Rivets heated, 1958 per day = average 270 per hour.
Size of rivets heated throughout, ⅞ in. by 2½ in. long.
Cost per day at 2s. 6d. per 1000 c.ft. = 8s. 9d.

The foregoing figures, taken during tests, were supplied to me by the actual user of both furnaces, and illustrate what can be done by gas furnaces. Needless to say, they have entirely superseded oil in these works for this class of heat treatment.

There are two types of furnace in general use to-day:

(1) Natural-draught furnaces.—Using gas at ordinary pressure and inducing the air necessary for combustion.

(2) Gas and air blast furnaces.—Using gas at ordinary pressure and supplying compressed air for combustion.

Furnaces used for temperatures up to 1000° C. are generally known as low-temperature furnaces, and those for temperatures up to 1350° C. as high-temperature or forging furnaces. When fixing a natural-draught furnace, there are several important factors to which it is necessary to give special attention. Let us assume that a natural-draught oven furnace is being fixed, measuring 36 in. deep by 24 in. wide by 12 in. high to the crown of the arch. This type of furnace is suitable for annealing and case-hardening, and temperatures between 750° and 1000° C. are required.

This size and type of furnace is found from experience to have an average gas consumption of 500 c.ft. per hour, and is provided with a rail (the delivering capacity of which is far in excess of the actual consumption) which, though acting as a reservoir for equalizing the pressure over the series of burners, does not help to any decision in regard to meter capacity. One satisfactory way of solving the meter capacity required is to count the number of burners, and allow that each passes 50 c.ft. per hour at 2 in. pressure at the minimum, adding 100 p.ct. to the calculation, for future extension. By this method service dimensions can readily be obtained, with the assurance that a constant pressure will be maintained—a very important point, since the success of the furnace depends almost entirely on this.

The regulation of the draught is also important. It is necessary to see that the chimney pull is not excessive, otherwise the heat units essential for raising and maintaining the temperature will be drawn up the flue before they are utilized. The method of adjustment usually adopted is to place a lighted taper to any of the sight holes on the furnace, and then manipulate the flue damper until the light is just balanced—that is, it is neither drawn in nor blown out. The advantages of natural-draught furnaces are their reliability for maintaining any given temperature up to 1000° C., and the fact that no air blast is required.

One type of gas and air blast furnace run on town gas at normal pressure, in conjunction with air pressure varying from 2 to 6 in. water column, has proved capable of attaining an oven temperature of 1500° C. This particular type has gas connections fixed at intervals along each side, requires no secondary air supply, and allows a given volume of undiluted gas to enter the furnace. The air passes through regenerators, and is thereby preheated, thus giving at the point of combustion an intense white flame, spreading equally over the arch, and ensuring an even distribution of heat throughout the oven.

Another design of furnace built with twin chambers and supplied with air at 2 to 3 lbs. per sq. in., and gas at normal pressure, is worked on the same principle as a simple blowpipe, but has special features of design. When lighting up a furnace of this type, after the gas has been ignited, the air is turned on and adjusted. This can be judged as correct when the flame assumes a violet tint—not a green cone as in the ordinary burner. The furnace can then be left until it becomes incandescent. When this point is reached it will be noticed that the flame issues from the flue outlet. It is at this period the final adjustments are made by regulating the gas and air cocks to show the flame at the outlet, just visible and no more.

The latest pattern of gas and air blast furnace equipment has novel features worthy of detailing, since the method of regulating the combustible mixture is entirely different from other types generally in use. This equipment consists of a nozzle inspirator, and a gas governor of the diaphragm type fixed in a vertical position close to the inspirator. The governor can be regulated to supply gas to the inspirator at atmospheric pressure. It only delivers a given quantity according to the suction effect set up by the inspirator, and so determines the mixture proportions delivered through the nozzles. To provide a means of adjusting the gas and air ratio, the suction effect is ample to induce a considerable excess of gas in the furnace, but the gas can be regulated by means of a small valve, situated between governor and inspirator, which can be screwed in or out according to requirements, until the final proportional mixture is obtained and permanently fixed. An important precaution is to see that the pressures are correct at the different positions of the equipment. Small pressure plugs are provided for this purpose; and once these positions are found, the furnace is entirely independent of the human element, and requires no further attention. From the foregoing remarks you will observe that, when the furnace is being lighted up, the air must be turned on first.

During a series of tests with this burner equipment, I found that the best results were obtained with the pressures adjusted at the different test points as follows.

(1) Pressure of air at inspirator = 8 in. water column.
(2) Pressure of mixture at nozzles, shown on a permanently fixed 12-in. water gauge = 3-in. water column.
(3) Governor outlet pressure with gas valve open = 1-10th above zero.
(4) Governor outlet pressure with gas valve closed showed a vacuum equal to air pressure divided by 8-in. water column.
(5) Pressure of gas at inlet of governor and furnace working at full capacity = 3-in. water column.

The greatest advantage a gas and air blast system has over natural draught is the time taken to attain the required temperature, which will probably be about 25 p.ct. less, with a corresponding increase in production and saving in gas. Assuming that it was 500 for gas, 100 for output, and 60 minutes for time with natural draught, the results for air blast would be 375 for gas, 125 for output, and 45 for time, so that, for less gas and time, more material is produced. Gas and air blast may be easily regulated to varying temperatures; 900° to 1350° C. can be had in the shortest possible time, and the sudden drop in temperature caused by frequent introduction of cold metal into the furnace can be quickly recuperated. This is a point worth noting, for the recuperative power of a furnace is one of its principal recommendations. It is certainly difficult to decide sometimes which system is best to instal for a specific class of work, but the manufacturer usually decides on air-blast, for speed in production, which is his prime objective.

Where gas and air blast appliances are in use, it is necessary to fix a back-pressure valve on the gas supply between the meter and the furnace. This eliminates risk of the high-pressure air getting back and flooding the gas mains. As there is always the possibility of manufacturers' adding appliances of this description to their plant without the knowledge of the gas undertakings' representatives, a clause should be inserted in the "Terms and Conditions of Gas Supply," making this safeguard compulsory.

ANNEALING.

The object of annealing steel is to soften it, so that it may be machined at the minimum cost of labour and tools. It is also done to eliminate external strains or brittleness set up in hammering, rolling, or finishing, and to ensure a more uniform condition, so that, when reheating for hardening is necessary, equal expansion and contraction is obtained. Owing to the vast improvements in gas-fired furnaces, and their almost absolute freedom from oxidizing effects, the work for annealing is placed in the furnace, raised to a temperature of 850° C., and maintained at this temperature from 6 to 8 hours. At the expiry of this period the gas is shut off, and air ports and dampers are closed, and the work remains in the furnace, and is allowed to cool as slowly as possible. The natural-draught oven furnace is used extensively for this operation, since the character of the flame tends to reduce oxidation to the minimum, and is also easily regulated to exclude all possibility of excess air entering the furnace.

CASE-HARDENING.

The process of case-hardening applies to articles of mild steel where a hard skin is required, the depth varying according to the time the steel is undergoing treatment, and to the carbon content, though the most satisfactory results are obtained with steel containing from 0·1 to 0·2 p.ct. of carbon. One method of performing this treatment is to place the work, packed in carbonaceous material, in iron boxes, taking care that the articles are not in contact with one another. The lids are fitted on the boxes, luted with fireclay, and then placed in the furnace and heated to a temperature of 950° C. The length of time the process is continued depends on the size of the articles and the form of carbonaceous material used; and this may be anything from 3 to 10 hours. At the end of the carbonizing period the boxes are withdrawn from the furnace and allowed to cool in a dry place. The next part of the process is to replace the articles in the furnace, and raise them to a cherry-red heat (800° C.). They are then taken out and quenched in water or oil. The object of case-hardening is to provide steel with a very hard surface and an equally tough core, which makes it suitable for withstanding great torsional, shearing, and bursting strains.

HARDENING.

Hardening a piece of steel may seem a very simple operation, but it is really one of the most important, and undoubtedly one of the most delicate, operations in connection with engineering. The term hardening means the production and fixing of the maximum hardness which any quality of steel is capable of possessing. Steels suitable for tools have critical hardening points between 725° and 780° C., and if they are subjected to higher temperatures the results will be unsatisfactory. High-speed steel suitable for cutting tools is perhaps the most difficult to harden properly, especially when we realize that this tool can be worked at such a speed that the point, though red-hot, does not lose its cutting edge. Twin-chamber gas and air blast furnaces are invariably used for this operation, owing to their capability of quickly attaining the required temperature, which, for high-speed steel, is round about 1200° C.

TEMPERING.

Tempering is often confused with hardening, but the two processes are entirely separate operations. When steel is hardened it becomes brittle; and for some tools this is a recommendation. For tools requiring a slender cutting edge—such as taps, dies, and twist drills—it is necessary to draw the temper. The process is performed in liquid baths, composed of oil and heated up to the desired temperature, varying from 240° to 265° C. If a higher temperature than oil is necessary, then a bath containing lead is used. The articles for tempering are placed in a wire basket and immersed in the oil or lead until they reach the required temperature. They are then withdrawn and allowed to cool. Gas-fired plates and revolving drums are also used for this treatment, these being more suitable for cutlery and certain motor parts; but whatever method is used,

a great deal depends on the quality of the steel and the purpose for which the articles are intended.

A FEW "DON'TS."

(1) Don't expect a natural-draught furnace to give results above 1000° C.

(2) Don't use air blast when natural draught will serve.

(3) Don't blame the furnace when anything goes wrong; examine the adjustments.

(4) Don't blame the gas for oxidation; examine air pressure for excess.

(5) Don't blame the gas for low temperature; examine air pressure.

(6) Don't work a furnace with excessive flue draught—efficiency is lowered and gas consumption increased.

(7) Don't work with an air pressure above that specified by the maker.

(8) Don't consider gas a luxury, or expensive as a fuel; net results are what always count.

(9) Don't forget that approximately 30 c.ft. of 500 B.Th.U. gas equals 1 lb. of coal.

(10) Don't forget that the gas consumption in any furnace is in proportion to the amount of work done.

(11) Don't forget that approximately 27 in. water column equals 2 in. of mercury, and equals 1 lb. pressure per sq. in.

(12) Finally, don't forget, when calculating the size of blower for supplying compressed air, to allow approximately 8 c.ft. of air for 1 c.ft. of gas. This provides ample reserve.

GAS-FIRED STEAM BOILERS.

At least 90 p.ct. of the steam used in industrial processes is generated in boilers which are either coal or coke fired. Where a steam unit is required for intermittent use, a gas-fired boiler is certainly ideal. Gas-fired steam boilers are designed ranging from ¼ to 15 H.P. and capable of generating steam for most purposes. Speed, economy, and absolute control are their chief recommendations. The average efficiency of these boilers varies from 60 p.ct. for sizes under 5 H.P. to 85 p.ct. for the larger sizes, under normal working conditions.

Since the work of any steam boiler is to convert water into steam, it was necessary to standardize some unit to represent its general efficiency as a steam producer. This can be defined as 33,479 B.Th.U. absorbed in water and steam, or the evaporation of 30 lbs. of water from feed water at 100° Fahr. and at 70 lbs. gauge pressure, or the evaporation of 34·5 lbs. of water from and at 212° Fahr., as equivalent to 1 boiler horse-power. Generally speaking a boiler can in no way develop power by itself, but, while acting as the means for this purpose, it would seem that to assign to it the term "horse-power" is illogical, because economy in the use of steam must depend upon the type of engine or appliance connected to the boiler, and there is no doubt that economy varies greatly with the various types in use. However, as a matter of convenience, the term "horse-power" as applied to a steam boiler seems justified, and will probably convey as intelligent an idea, regarding the power of a boiler, as any other term could furnish. Since the horse-power of a boiler is obtained by the amount of heat units available in the fuel, and the efficiency by the proportion of the heat transmitted to the water in the boiler, the primary step would be to provide a source capable of supplying an adequate amount of heat units to perform this work. Assuming that coal gas was the fuel to be utilized, and knowing its calorific value, together with the approximate efficiency of the boiler, the heat units in cubic feet of gas per horse-power per hour can be worked out by the following formula:

$$\frac{33{,}479 \text{ B.Th.U} \times 100 \times \text{H.P. of boiler}}{\text{Efficiency of boiler} \times \text{B.Th.U. per c.ft. of gas}} = \text{Consumption of gas per H P. per hour.}$$

In working out the above, and rating the boiler efficiency at 60 p.ct. with gas at 500 B.Th.U. per c.ft., the consumption in this case would be 123·9 c.ft. per hour per H.P., and indicates that a 1¼-in. service and a 20-light meter are necessary to meet the specific requirements of a 1 H.P. boiler.

I was asked some time ago to call on a certain firm and discuss a proposal to instal a gas-fired steam boiler to act as a relief unit during the week-ends, in preference to the existing Lancashire boiler. The proposal was to supply one steam-jacketed pan of 60 gallons capacity, one calorifier delivering 160 gallons per hour at 140° Fahr., and eight 8-loop 12-in. radiators, each having approximately 24 sq. ft. of radiating surface. A further consideration was that the boiler must require the minimum attention from the moment of lighting-up to the completion of the week-end period, must be self-contained in regard to water feed and gas control, and be worked at a gauge pressure of 20 lbs. per sq. in.

In deciding the size of boiler to do this work, a series of calculations had to be made and adopted; and I propose to detail the method, as an aid to others in propositions of a similar nature. The latent heat of 1 lb. of steam is 970 B.Th.U. The evaporation in pounds of steam used at 20 lbs. gauge pressure per hour for each appliance was calculated from the following formulæ:

(1) Jacketed pan containing 60 gallons of water to be raised to boiling point.

(2) Calorifier, capacity 160 gallons of water per hour, maintained at 140° Fahr.

$$= \frac{\text{Gallons} \times 10 \times (T - t) \times 100}{\text{Latent heat of steam} \times \text{efficiency}} = \text{lbs. of steam.}$$

When latent heat of steam at 20 lbs. gauge pressure = 940 B.Th.U. per lb. of steam.

When efficiency of appliances were assumed at 80 p.ct.

When T = final temperature of water at 212° Fahr. and 140° Fahr. respectively.

When t = initial temperature of water assumed at 42° Fahr.

(3) Eight radiators having 24 sq.ft. of radiating surface each; temperature of room to be maintained at 60° Fahr.

$$\frac{\text{Sq.ft. of radiating surface} \times 1{\cdot}8 \times (T - t) \times 100}{\text{Latent heat of steam} \times \text{efficiency}} = \text{lbs. of steam.}$$

When latent heat of steam at 20 lbs. gauge pressure = 940 B.Th.U. per lb. of steam.

When efficiency of radiators was assumed at 90 p.ct.

When T = temperature of steam inside radiators = 260° Fahr.

When t = temperature of surrounding air = 60° Fahr.

When 1·8 = B.Th.U. emitted per sq.ft. of radiating surface per degree Fahr. raised.

In the foregoing proposition 325 lbs. of steam per hour were found necessary; this being equivalent to a 10-H.P. boiler having a gas consumption of approximately 840 c.ft. per hour (calorific value of gas, 500 B.Th.U. per c.ft.) giving approximately 2·5 c.ft. of gas per lb. of water evaporated.

The question of the feed water being made independent of attention was overcome by fixing a "Solar" automatic feeder. This auxiliary is regulated by a ball valve enclosed in a heavy cast-iron chamber, taking the place of the usual steam injector and connected to the main by an intermediate screw valve. This automatically maintains the water level of the boiler according to the steam demand. The gas supply to the boiler is controlled by an automatic valve actuated in accordance with the pressure of steam and as the demand increases or decreases. It comes into action at 20 lbs. gauge pressure; and immediately this pressure is reached, the gas supply closes down, allowing only a minute flame at each orifice, just sufficient to keep the boiler running steadily. These two auxiliaries provide an equipment which is entirely self-acting, and which makes for economical working. Much publicity is being given to the utility of small gas-heated steam boilers for use in tailoring establishments, many of these being operated in conjunction with clothes presses in shop windows.

Discussion.

Mr. JAMES CUBIE (Glasgow) thought the value of the paper was enhanced owing to the fact that few text-books dealing with the subject were available. He suggested that they should consider the advisability of publishing such papers in full in the annual transactions. He was interested in Mr. Brown's remarks on the adjustment of furnaces. He would like to have heard more about the injector. It might be a good point for makers to put a label on each furnace, giving the gauge standard of the gas injector.

Mr. LAING (Brechin) thanked the Western members for the cordial reception he and his colleagues had received. He expressed his pleasure at being present to hear such an instructive paper. They in the East of Scotland had not the same opportunities for coming into such close contact with industrial problems.

Mr. W. J. LENNOX (Falkirk) said that more publicity should be given to the industrial side, which was not fully developed.

Mr. J. GRAHAM (Kilmarnock) suggested that the question of back-pressure valves should be brought to the notice of all makers. The recent trade depression was responsible for the small increase in the number of gas furnaces in use in the country. In some cases the initial cost was too high.

Mr. N. SMITH (Greenock) was of opinion that in order to demonstrate the efficiency and use of furnaces, generous terms should be offered to consumers. In Greenock, furnaces were fitted at cost price, and special rates given for guaranteed consumptions. With regard to gas-heated steam boilers, they had been successful in introducing them into the shipyards, where they were used for steaming wood for boats. With these boilers they were able to compete successfully with solid fuels in church heating.

Mr. M'ISAAC, in closing the discussion, emphasized the importance of the use of gas for rivet heating and steam raising. With regard to rivets, they had the example of oil costing 13s. per day, against gas at 8s. 9d. Not only was the cost less, but the output was increased by 15 p.ct. There was a great field for the gas-heated boiler. He was of opinion that the price of gas should fluctuate with the cost of all other fuels.

A vote of thanks was accorded Mr. Brown.

The Western District are due to visit the meter works of Messrs. Alder and Mackay, Ltd., Edinburgh, on Saturday, Jan. 31.

Heating and Ventilation.

The annual general meeting of the Institution of Heating and Ventilating Engineers will be held on Feb. 11, when Mr. A. H. Barker, B.Sc., Wh.Sc., will read a paper on "Unsettled Questions in Heating and Ventilation."

LOW-TEMPERATURE CARBONIZATION.

The "Fusion" Retort.

The subject of "The Low Temperature Treatment of Bituminous Materials" was discussed on Friday evening last, at a joint meeting of the London Section of the Society of Chemical Industry and the Chemical Engineering Group, which was held in the hall of the Royal Society of Arts, John Street, Adelphi. The gathering was presided over by Mr. C. S. Garland, B.Sc., A.R.C.Sc., F.I.C. (the Chairman of the Chemical Engineering Group), who was supported by Dr. Bernard Dyer, F.I.C. (the Chairman of the London Section of the Society of Chemical Industry). The subject was introduced by Mr. T. W. STAINER HUTCHINS, M.Inst.E.E., in a paper in which he dealt particularly with low-temperature distillation with what is known as the "Fusion" retort; this being a process with which he has had a close practical connection.

The author introduced his subject by setting-down no less than twenty-two features which he considers should be possessed by plants intended for the low-temperature treatment of bituminous material. In the first place, they must be profitable in application. Again, where the percentage of moisture in the material being treated is under 5 p.ct., the design of the retort should permit the addition of water up to an amount to make the total equal to 5 p.ct., or alternatively (and in some cases preferably) the addition of steam and (or) gases. Where the water in the material to be treated is in excess of (say)10 p.ct., then drying before heat treatment should be employed, as usually dryers are lower in capital cost and running expenses than retorting plant. The retort should be designed to provide a large vapour-releasing surface of the material during the heat-treating period, and agitation of the material during such time. The design and construction of the furnace should be such as to ensure a heating efficiency of at least 75 p.ct. The use of superheated steam, unless the latent heat of the steam is recovered, brings the heating efficiency down almost to zero. Where a retort is heated externally, the flow of the heating gases should be counter to the flow of the material under treatment. If this method of heating is supplemented by internal heating, the internal heating should be uniflow with the material being treated. When the retort is heated internally, and heat efficiency is of importance, the flow of the heating gases should be contra to the flow of the material being treated. The direct application of molten lead as a heat-carrying medium would not fulfil various conditions laid down by him; and there would be, in most cases, loss of lead due to a chemical combination between the ash and the molten lead, &c. On the other hand, the employment of lead for heating indirectly would necessitate complicated and expensive plant, and the lead-heating furnace would have but a low heating efficiency. Where the retort is heated externally, or externally and internally, and preferably in all other cases, the inside of the retort should be kept free from scale. If the retort is employed for treating materials low in volatile matter, provision should be made for the removal of the resulting dust.

All the points here noted, as well as the others set-out by him, the author claimed to have taken into account in the design of the "Fusion" retort, which he then proceeded to describe. After various experiments, a retort having an estimated capacity of 5 tons of average bituminous coal per 24 hours was installed at Middlewich; a small hand-fired furnace being employed for obtaining the necessary heat for the retort. As, however, a unit of 5 tons would be unsuitable for a large installation, consideration was given to the design of larger units. While, said the author, it is the common practice to set such rotating tubes (or retorts) through which the material is to pass on an incline, an arrangement of this kind is, in fact, frequently unnecessary, and in certain cases a disadvantage. In retort work, it would appear to be preferable to adopt the horizontal type—that is, set so that there is no incline in the tube, leaving the head or depth of the material at the feed end of the tube to cause or govern the flow. This, apart from other factors, governs the diameter of the tube in relation to length.

In the case of the "Fusion" retort, the material, crushed if necessary, is elevated into bunkers. The feed valve consists of a small hopper and tube; and inside the tube is a shaft upon which are small paddles or blades for propelling the material from the hopper into the retort. There are arrangements by which the feed may be increased or decreased at will. The retort, in sizes having a capacity of 25 tons or less per 24 hours, is carried on two sets of rollers, one set placed at each end of the rotating tube. When the units are larger, the retort is carried on three or more sets of rollers. The speed of rotation of the retort, in the case of the treatment of bituminous material, varies according to the size of the unit and the material being treated, but is usually in the neighbourhood of 3½ to about 6½ revolutions per minute. Placed inside the retort are the so-called breakers, the design of which may be varied according to the material being treated. The length of the breakers is, however, usually about one-fifth to one-eighth the length of the retort, so that in a given retort there may be five, eight, or more breakers. As the breaker revolves it carries round with it a quantity of the material being treated, so that, apart from the movement of material due to the rotation of the retort, additional movement is imparted to it by the ploughing and spreading action of the breaker. The retort being horizontal, the depth of the material at the feed end is greater than at the discharge end of the retort; but to assure a suitable depth at the latter end, a weir is provided which causes a dam varying in depth from about 4 to 9 in.

A chamber at the discharge end of the retort receives not only the residue of the material after treatment, but also the permanent gases, oil vapour, &c. Finally, the residue passes through the discharge valve, in which there is a spindle which oscillates, and from this spindle is carried a push plate. By the oscillating action, every forward thrust pushes out from the toe of the boot-shaped hopper a charge in proportion to the area and, within limits, the stroke of the push plate. The residue itself forms a seal, and it has been found in practice sufficient to prevent the escape of gases or the inlet of air to the retort, within limits of pressure necessary for the satisfactory working of the retort. The permanent gases and the oil vapour, &c., are usually carried off from the top of the end chamber to any suitable form of condenser. When the material is low in volatile, on the top of the end chamber is fixed a dome, in which is carried a rotating dust extractor.

The heating of the "Fusion" retort, where external heating only is employed, is arranged by the passage of hot gases in a direction from the discharge end of the retort tube towards the feed end. Alongside this heating chamber is a second chamber, described as a combustion chamber. The heating gases are, in the first place, received in the combustion chamber, and from there pass to the heating chamber through small ports in the party wall between the combustion chamber and the heating chamber. These ports may be opened or closed, or partly closed, according to the heat curve desired. Where supplementary internal heating is desired, or water or steam is to be admitted, it is effected by admission into the top of the tube of the feed valve, at a point close to the end plate of the retort. Where internal heating only is required, the retort would not need a heating chamber or combustion chamber, but would be lagged for the purpose of conserving the heat; and the heating gases would be admitted from the feed end of the retort, or preferably from the discharge end, introduced through the hood, and exhausted through the feed valve. In either of these events, in place of a single tube in the feed valve there would be a double tube—one for carrying the solid and the other for the gases or vapours.

The following figures relate to a few bulk samples of material treated:

Results of Tests.

Material Treated.	Moisture in Raw Material, P.Ct.	Gallons of Oil (Water Free) per *Wet* Ton.	Specific Gravity of Oil.	C.Ft. of Gas per *Wet* Ton.
South African torbanite	0·5	96	0·9175	1770
English oil shale	12·58	31·5	1·016	1850
*Sawdust	13·79	17	1·1274	2200
Indian coal	10·92	23·8	0·9592	1125
Peat	28·65	9	1·051	3000
English coal slack	6·72	16·4	1·122	1025
English cannel coal	1·54	60	0·912	870
Esthonian shale	4·18	65	0·9671	1340
Brown coal	27·0	22·5	1·102	1300
South African "duff" coal	3·65	14·6	1·050	1570
Nova Scotia shale	1·75	28·2	0·9871	1120
English "duff" coal	2·3	21·5	1·120	1960

* In addition to the oil recovered there were 102 gallons of acid liquor of 1·26 p.ct. acidity.

The above figures of oil yields do not include the light spirit recovered from the permanent gases by "stripping" or "gas washing."

The gas-releasing surface in a "Fusion" retort 50 ft. long by 4 ft. diameter is approximately 200 sq. ft.

While drawing the attention of his audience to the principal features of the paper (which was accompanied by a series of lantern slides), Mr. Hutchins explained that he is not unduly optimistic about the future of low-temperature carbonization. He certainly does not think that in every case it would pay every man to pass his fuel through a low-temperature retort. There are particular circumstances in which it would pay. For instance, in London there is a very good market for a smokeless fuel. Prices are high, and there may be certain collieries which will enable the conditions to be met; but "to broadcast the country with the suggestion that any old fuel, at any old price, can be treated at a profit," he thinks is going too far. Of course, it has to be remembered that, apart altogether from any question of profit, there are national factors to be considered; but, at the same time, "it is very difficult to induce a business man to put up his money when he will get no return, and purely from motives of patriotism, when there is no war."

The CHAIRMAN, before declaring the meeting open for discussion, thanked Dr. Lander and his staff at the Fuel Research Station for the extremely kind way in which they had received those members who had been privileged to visit the station that afternoon. They had been shown everything there was to be seen, and had spent a most enjoyable and instructive afternoon.

Discussion.

Dr. C. H. LANDER (Director of Fuel Research) remarked that Mr. Hutchins had given them a valuable paper on the general question of the low-temperature treatment of bituminous materials. The subject from the technical point of view was complex, but the commercial problems involved in this low-temperature treatment presented even greater difficulties. At the present time great interest was being taken in the low-temperature carbonization of coal, which had now been before the public for some twenty years. In order to formulate some of the requirements of an apparatus which could deal efficiently, both technically and economically, with the low-temperature carbonization of bituminous coal, it was necessary to consider the problem in its wider aspects, and to envisage what were the ultimate possibilities presented by this treatment. The author had formulated in a very lucid manner the ideal requirements. It would, perhaps, be of value to look back, and see what the course of development had been which had given rise to the existing interest in the process. It started, as he had said, some twenty years ago, when various people made suggestions for the treatment of coal in such a manner as to obtain smokeless fuel and to give a purer atmosphere. For a long time the problem continued to occupy this position; but in 1912 there was a Royal Commission appointed to consider the question of oil fuel for the navy, and this Commission was under the Chairmanship of the late Lord Fisher. A careful inquiry was made into the problem from all points of view, and the final recommendation of the Commission was that the most hopeful way of obtaining a substantial contribution of oil fuel from home sources for the navy and for the mercantile marine lay in the treatment by a low-temperature method of the 35 million tons of coal at present consumed in the domestic grate. There was a field which apparently lay ready for them, if certain important problems could be solved. It was pointed out by them that, in addition to the oil, low-temperature methods might provide for the householder a smokeless fuel which could be burned with ease in existing domestic grates. One important aspect of the subject, therefore, was to obtain a fuel in lump form which was robust, and which could easily be transported. This point had not been given prominence in the list of conditions set down by the author. The whole problem was a very attractive one, and of first-rate national importance, but it depended absolutely, in peace time, upon whether the return from a process was (say) 19s. 9d. per pound expended or 22s. At the present time he thought it might fairly be stated that the more technical problems of obtaining robust fuel, together with an adequate recovery of oil and gas, had been solved; it was possible by certain processes to produce coke and oil, with a certain amount of gas as a bye-product. But this was not to say that there was not still room for a tremendous amount of work on the subject. When, however, they came to this question of £ s. d., they were up against a more difficult problem; for it was not equally clear that the commercial aspect presented—namely, that of carrying out the process at a cost which would justify its application to such a large quantity of coal as would settle the national problem—had been solved. Interesting developments were taking place; plants of commercial size were being erected; and it was certainly to be hoped that the commercial results obtained would justify the optimism of those responsible. One difficulty, of course, was the relative prices of the raw material and the finished products. If coal was used which was at present of the nature of waste product from a pit, a margin for profit was apparent, which disappeared if the matter was looked upon from the national standpoint. In the latter case, since coal at present finding a free market for domestic purposes must be utilized as the raw material, this raw material would be a direct competitor with the finished products, and, therefore, the cost of the raw material into the works must be near the cost of the smokeless fuel *ex* works. Somewhat similar conditions applied to the oil, which, when produced in large quantities, would have a direct competitor in imported petroleum. With regard to the plant described by the author, this, in his (the speaker's) opinion, was a very useful, cheap plant, which would to a considerable extent "fill the bill" in certain directions. These matters were illustrative of the important points which would have to be considered when the subject was being raised from one of local significance—using cheap raw material, and selling the products in a limited market—to one of really national proportions.

Mr. R. M'LAURIN (Glasgow) remarked that the question which had to be faced in attempting to convert the high-temperature man to low temperature was: "Are you able, by low temperature, to get more out of your ton of fuel than by the high-temperature process?" It seemed to him that the "Fusion" retort could only appeal in the case of certain fuels—such as shales which broke down to a pulp. To put it forward for dealing with a Scotch shale would be hopeless. With regard to coal, it would not be easy to convert a gas manager to the use of a low-temperature process to deal with small coal which would make a reasonable coke in vertical retorts. The only chance was for coals which could not be successfully worked in vertical retorts; and there were not many which would not pass through a vertical retort in some way. Looked at from the point of view of the relative number of therms obtained and the size of the material produced, he did not think the "Fusion" system would appeal to the gas manager. Personally, he would be very glad to hear of a method for dealing satisfactorily with small coal; but it would have to be something which could beat the high-temperature process by making a little more money out of each ton. Mr. Hutchins said that light oil came off first, and the heavy oil subsequently by cracking. Personally, he thought the opposite was the case—the heavy oil came away, and then by cracking this gave off a light oil. In coal distillation there was very little light oil given off; heavy oil was really the natural product of such distillation.

Dr. CULLEN, who has had considerable experience of low-temperature distillation, testified to the simplicity of operation of the "Fusion" retort—"which could be managed by an ordinary labourer." The economic aspect of the question was, however, he declared, all-important; economics, in the long run, would decide whether a process was or was not successful. Questions to which satisfactory answers were vital were: "How much does it cost to get this oil, and what is the oil worth when you have got it?" Replies to these queries were essential in assessing the value of any process.

Captain GOODWIN said the high-temperature carbonization industry were about twenty years before they knew enough about their oils to make a profit out of them, and he thought the low-temperature oils had to go through much the same process. It was true that at the present time there were distillers who would give a fair price for low-temperature oils, but the question was: "How much are they prepared to take?" Several years of work were still required before they could know exactly what went on inside the retort. Reference had been made to the problem of dealing with small coal, for which it was quite clear a retort like the "Fusion" was very well adapted. One of the big outlets for a semi-coke of this kind was for pulverized fuel; a large development of low-temperature carbonization in connection with power stations would be seen.

Mr. W. MACLAREN pointed out that the Salerni process had solved certain of the difficulties to which reference had been made by the author.

Mr. CUNNINGHAM CRAIG, the oil expert, also contended that the whole point was one of £ s. d.; it was no use generalizing about coals and shales. He was rather astonished to hear it said that these were difficult problems, because nearly all of them had been worked out some years ago. Scientific men were quite well aware which was the best process to use in each part of the country. The "Fusion" retort, in the actual making of oil, "had given better results than any other retort of which he knew."

Mr. JOHN ROBERTS drew attention to the fact that from specially arranged coke ovens it was possible to turn out large quantities of smokeless fuel—the provision of which was an urgent problem.

The CHAIRMAN, owing to the length of time which the meeting had already occupied, was compelled at this point to ask any others who might wish to speak to send in their remarks in writing; and a brief reply by Mr. STAINER HUTCHINS to the various points that had been raised brought the proceedings to a close.

INTERNATIONAL COMMISSION ON ILLUMINATION.

Meeting at Geneva.

(*Continued from p.* 697, *Aug.* 27.)

On Tuesday afternoon Col. Edgcumbe was in the chair, and in opening the proceedings said that the discussions of that meeting would be divided under the subjects of (*a*) Symbols, (*b*) Definitions, and (*c*) Vocabulary.

The first communication was presented by Mr. J. W. T. Walsh, of the National Physical Laboratory, General Secretary of the Commission, under the title:

PROPOSALS OF THE BRITISH NATIONAL COMMITTEE ON THE SUBJECT OF PHOTOMETRIC DEFINITIONS AND SYMBOLS.

Under "Definitions" the following were given:

Brightness.—The brightness of a surface in a given direction is the luminous intensity per unit of projected area in that direction. This definition can be applied equally well to volume sources (such as the sky) by treating them as surfaces.

Units of Brightness.—The unit of brightness is the candle-power per unit area. The brightness of a perfect diffusing surface can also be expressed in terms of lumens per unit area; and the brightness of *any* surface can be expressed in terms of lumens per unit area emitted by a perfect diffusing surface of equal brightness.

Efficiency.—The efficiency of an electric lamp is the ratio of the luminous flux to the power input. It is expressed in lumens per watt. The efficiency of a source dependent on combustion is similarly expressed in lumens per thermal unit per hour.

Under "Symbols of Photometric Quantities" was given the following table:

Quantity.	Symbol.	Reason for Adoption. (*a*)	(*b*)
Luminous flux. . .	*F*	Widely adopted	Not in electrical symbols
Candle-power . . .	*I*	" "	Confusion with symbol for current not likely
Illumination . . .	*E*	Almost universal	Confusion with E.M.F. not likely
Brightness	*B*	Widely adopted	Confusion with magnetic flux not likely
Reflection, ...	ρ	Widely used	Small Greek letters recommended for dimensionless quantities in international electrical symbols
Absorption, and . .	α		
Transmission ratios .	γ		

Mnemonics: *F* = Flux. *I* = Intensité. *E* = Eclairement. *B* = Brightness. ρ, α, γ = r, a, t = reflection, absorption, transmission.

It was stated that in suggesting these symbols the British Committee had had under review the current literature of the different countries, as well as the standard works dealing with

photometry and allied subjects, and had been guided in the main by two principles which in order of importance were (see table): (*a*) A desire to unify instead of to supplant existing practice; (*b*) a wish to avoid confusion with the international electrical symbols wherever there was a possibility of the photometric and electrical symbols occurring together.

The British proposals were unanimously adopted.

French Report.

M. Fabry next reviewed the Report of the French Committee, which had been written by M. Blondel.

American Recommendations Respecting Photometric Nomenclature and Symbols.

Dr. Sharp then gave a résumé of the American Committee's recommendations. The Committee proposed various modifications of terms, &c., put forward by Great Britain. Colour nomenclature; surfaces and media modifying luminous flux; illumination; illuminants; and photometry were dealt with in the exhaustive communication from America.

French and Italian Proposals.

In the discussion which then ensued on the British, French, and American reports it was agreed that the following committee of technicians be formed to deal with technical definitions: M. Fabry (France); Dr. Crittenden (United States); Dr. Bohm (Italy); Dr. Joye (Switzerland); Col. Edgcumbe (Gt. Britain). Other items discussed in detail were point source,

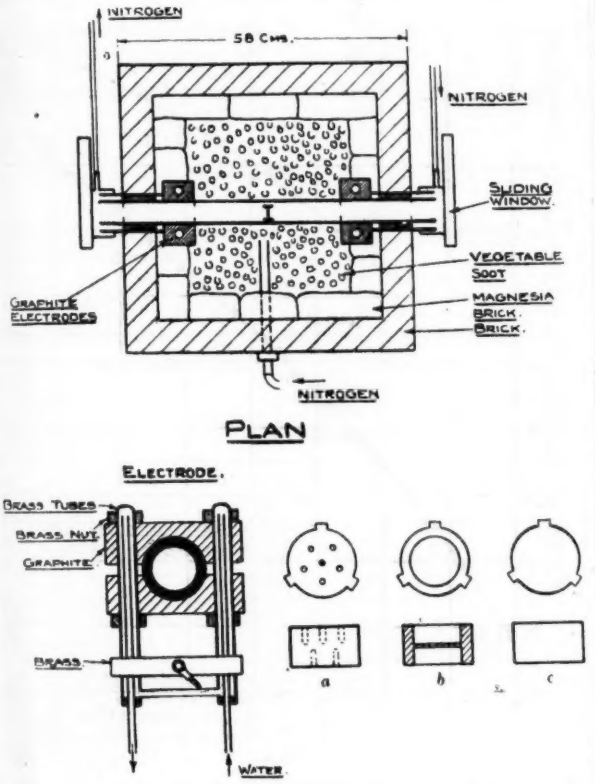


Fig. 1.—Diagram of Furnace, Electrodes and Graphite Plugs.

brightness, radiance, diffuse and regular reflection, brilliance, radiation, effluence, units, vocabulary, and the Lambert unit.

M. Fleury then presented the report of the French Commission on definitions and photometric symbols submitted by the French Illumination Committee; after which Dr. Bohm introduced an elaborate vocabulary which had been produced by Italy. Its object, he stated, was to render possible an interchange of thought on a similar basis by peoples of different countries.

Dr. Crittenden pointed out that an English vocabulary prepared in America already existed.

Dr. Mailloux, on being asked for his views, said he had recently accepted the chairmanship of a special permanent Committee on Vocabularies, and that a sub-committee was now at work preparing a vocabulary.

The desirability and necessity of appointing an international committee on the subject, working on the same lines as the International Commission on Photometry, was suggested by M. Blondin.

Mr. Dunn proposed that the question be referred to the existing Electro-Technical Commission, with a request that they should take it up, possibly with the experienced assistance of Dr. Mailloux. To this Dr. Mailloux respectfully dissented. He suggested the appointment of a committee of three, of which the chairman should be Swiss, and that the central office for the work should be in Switzerland. There should be two members speaking French and English. As President of the Electro-Technical Committee he would himself be pleased to co-operate, but that Committee would not desire to assume any additional burdens, because if they had too much placed in their hands they would not be able to do full justice to anything they had undertaken.

Dr. Joye, Col. Edgcumbe, M. Fabry, Mr. Largiader, Mr. Paterson, Dr. Hyde, M. Filliol, M. Vautier, and Dr. Bohm having expressed their views, the appointment of a Committee of three was unanimously agreed to, the vocabulary to be in four languages—French, English, Italian, and German. It was finally resolved that to provide for the need of Spanish or other language the Committee should be empowered to increase its number as and when they might find it necessary.

Heterochromatic Photometry.

M. Ch. Fabry presided at the meeting of the Commission held on the morning of Wednesday—the second day of the Geneva session. He first presented his report on "Heterochromatic Photometry," during which Dr. Hyde took the chair.

Mr. H. Buckley, B.Sc., then submitted a paper by Mr. L. J. Collier, M.A., Mr. F. J. C. Brookes, M.F.C., and himself, embodying a report of work carried out at the National Physical Laboratory, Teddington, during 1923-24. It was undertaken as a result of suggestions made in a note by M. Fabry on the researches which he considered it would be useful to carry out in connection with the problems of heterochromatic photometry. M. Fabry is Chairman of the Standing Sub-Committee of the International Commission on Illumination and Heterochromatic Photometry. He had pointed out that the physical aspects of the various questions involved are quite as important as the physiological and psychological aspects. One of the former, which is of very frequent occurrence in heterochromatic photometry, as well as

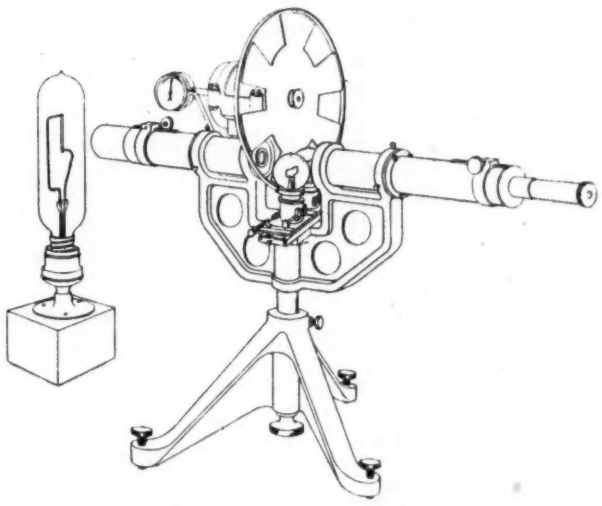


Fig. 2.—The Optical Pyrometer.

in other somewhat related branches of science, is the energy distribution curves with respect to wave-length of the luminous sources involved. The suggestion was also made that a "black body" at a definite temperature, or a series of definite temperatures, should be utilized as a standard source of energy distribution.

It was thought that the best method would probably be to compare with that of a "black body" the spectral distribution of incandescent tungsten in the form of lamps operating under prescribed conditions, and that these could then very conveniently be used as sub-standards of energy distribution. The prescribed conditions would probably be specified by the potential difference across the lamp terminals, the current through the lamp, the lumens per watt, or any other condition determining a definite temperature of operation of the tungsten.

Dr. Crittenden, of the Bureau of Standards; Dr. Rayner, of the National Physical Laboratory; and the President of the Commission, Dr. Hyde, were invited to send criticisms, the result of which was that the National Physical Laboratory was requested to undertake the determination of the relation between the colour temperature and luminous efficiency of tungsten lamps. Sir Joseph Petavel (Director of the Laboratory) agreed. The results were given in the report.

The apparatus employed consisted of (1) a furnace capable of operation up to 2400° K.; (2) an optical pyrometer; (3) several tungsten lamps; and (4) a Lummer-Brodhun photometer. Fig. 1 shows diagramatically the furnace, electrodes, and graphite plugs.

The furnace consisted of a carbon tube 625 mm. long, 27 mm. internal diameter, and 39 mm. external diameter, surrounded with lagging of vegetable soot. A stream of nitrogen gas was passed down the tube to provide a non-oxidizing atmosphere and increase the life of the tube. Carbon tubes, however, proved very unsatisfactory, since it was found impossible to operate

them at temperatures above 1900° with a clear atmosphere; nor was it possible to get a satisfactory life out of them. Later it was decided to try pure graphite tubes. They were of the same length and internal diameter as the carbon tubes; the walls were 6·5 mm. thick. Owing to the lower resistance of graphite, considerably more current was required—about 800 amperes for a temperature of 2300° with the thick tube, while with the thinner one 2400° was obtained with about 500 amperes. As the source of black-body radiation, a plug of graphite located at the centre of the tube was used.

Several types of plug were tried. They are illustrated in fig. 1. *a* is a plug 12 mm. thick, into which several holes 1·5 mm. diameter and nearly 6 mm. deep were drilled from both sides; *b* is a similar sized plug bored with a 15 mm. hole from each end, so that the thin portion in the middle was about 0·75 mm. in thickness; *c* is a plain plug. The plugs rested in contact with the inner walls of the tubes at the three projections, so that there was very little cooling of the tube by the plugs. The space between the plugs and the tube provided a path for the stream of nitrogen. The temperature measurements were made by means of an optical pyrometer of the disappearing filament type, similar in pattern to that described by Forsythe ("Astro. Journal," Vol. 43, p. 295, 1916), and illustrated in fig. 2.

Many of the details are due to Mr. F. H. Schofield, of the Physics Department of the National Physical Laboratory. The

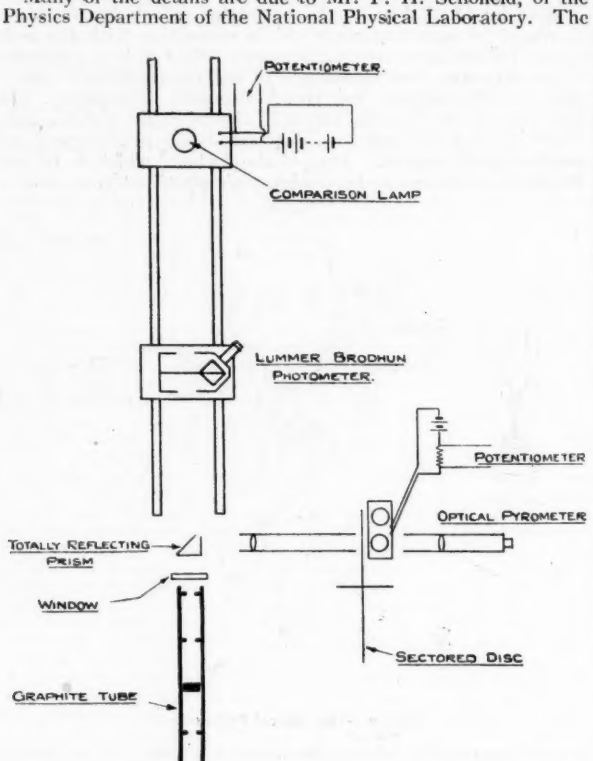


Fig. 3.—General Arrangement of the Apparatus.

furnace was constructed there to his design, and the Commission had the benefit of his experience and advice in the calibration. In calibrating the pyrometer, the furnace was held at the temperature of melting palladium; lower temperatures being obtained by the use of sectored discs and Wien's equation. It was also calibrated from the temperature of melting gold; lower temperatures being similarly obtained by the use of sectored discs. The two calibrations between the melting points of gold and palladium, which were taken to be 1828° K. and 1336° K. respectively, were in very close agreement; no point being more than 2° from the mean curve. Extrapolation to temperatures higher than that of melting palladium were also obtained by the use of sectored discs, which were constructed by the Metrology Department. The type of disc is shown in fig. 2. The error of opening does not exceed 0·5 p.ct. in the case of the narrowest slits. The red glass used in the eye pieces was a piece of Corning high transmission red glass of 0·67 cm. thickness, and limiting effective wave length of 0·6555 μ at 1800° K. The temperature scales was based on the following values:

Melting point of palladium 1828° K. $C = 14{,}350\,\mu$ deg.

The tungsten lamps were eight in number; two of them, 23 *G* and 24 *Q*, were 100 volt 75 watt and 100 volt 30 watt lamps respectively, of the form used as standards at the National Physical Laboratory. Three test lamps, 36 *A*, 36 *B*, and 36 *C*, were ordinary 100 volt 60 watt lamps of the commercial squirrel-cage type. The filaments were about 54 cm. long pinched to two leading-in wires, and passing over eleven anchor supports. Three other test lamps, 18 *D*, 18 *F*, and 23 *F*, were similar to 23 *G*. The Lummer-Brodhun photometer was of the ordinary contrast pattern. The electrical measurements were all taken on a Tinsley vernier potentiometer. In fig. 3 is shown schematically the general arrangement.

The reflecting prism enabled the plug to the furnace to be viewed at right angles to the photometer bench. The transmissions of the window and reflecting prism were determined by means of the optical pyrometer, and found to be 92 and 84 p.ct. respectively, and were allowed for in the temperature determinations. Observations were made of the voltage at which it was necessary to operate the comparison lamp in order to colour-match the integral light from the furnace, the reflecting prism being removed. The temperature of the furnace was observed immediately after each observation of colour-match, the reflecting prism being placed in position. For any one temperature, ten to fifteen observations of the colour-match voltage and temperature were made alternately, such a set usually requiring about 25 minutes. The temperature remained fairly constant, and in no set of observations did the extreme readings of the optical pyrometer vary over more than 1 p.ct. of the current reading, corresponding to a variation of about 10° at 1800° and 20° at 2400°. In the great majority of sets, the extreme variation was less than ½ p.ct. of the optical pyrometer current. Fig. 4 shows the agreement of observations obtained in colour-matching the light of the furnace against lamp 23*G*.

Corresponding curves were drawn for the uncorrected relation between colour temperature and efficiency of National

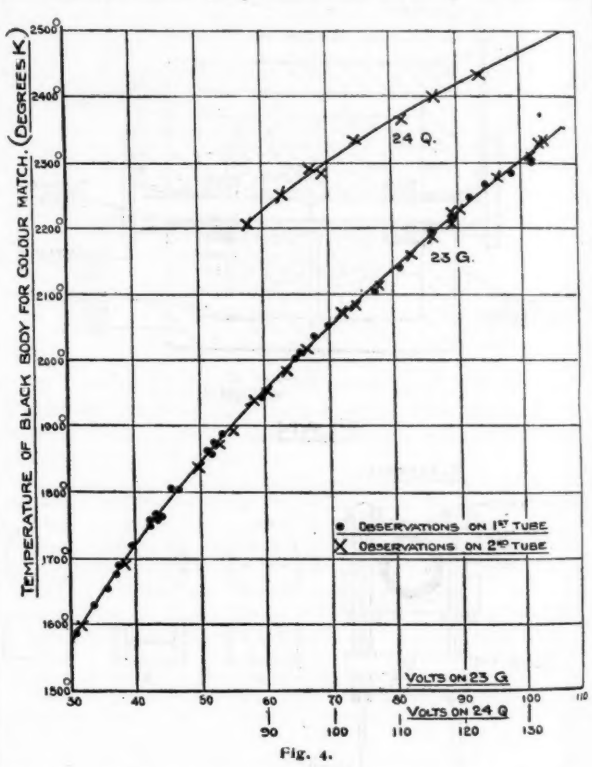


Fig. 4.

Physical Laboratory standard lamps; for the uncorrected relation between colour temperature and efficiency of squirrel-cage 100 × 60 watt lamps; and for the corrected relation between colour temperature and efficiency of tungsten. All these curves were shown in the paper. The last curve was shown to agree with that given by Hyde, Forsythe, and Cady over a considerable portion of the temperature range, but that at temperatures higher than 2350° there is evidence of a progressive departure from it. The maximum difference up to this temperature is about 6°.

The paper concluded with a reference to future work. It is proposed to continue by repeating the experiments on the graphite tubes, and by using lamps free from deposited material. Special lamps are being constructed, consisting of two single-loop filaments of considerably different lengths. It is also intended to construct a vacuum furnace, in co-operation with the Physics Department, and to continue the work on relationship between efficiency and colour temperature over as wide a range of temperature as possible.

The next paper taken was one by M. JOUAST, "Sur L'Emploi des Ecrans Absorbants en Photométrie Hétérochrome," of which he gave a brief summary.

(To be continued.)

Southern Association of Gas Engineers and Managers (Eastern District).—There is to be a meeting of the Eastern District of the Association to-morrow (Thursday), at 2.30, at the Institution of Gas Engineers, No. 28, Grosvenor Gardens, S.W.

HISTORY OF LIGHTING.

The first meeting of the newly-formed Sheffield Illumination Society was held on the 14th inst., when those attending had the pleasure of hearing an interesting address on the "History of Lighting and Methods of Measurement," by Mr. J. F. Colquhoun (the Chief of the Sheffield Corporation Lighting Department), to whose efforts the successful inauguration of the Society is largely due.

Mr. Colquhoun stated that the importance of public lighting in the good government of any city is not sufficiently realized. The earliest record of artificial light being used is in the Palæolithic Age, about 35,000 years before Christ. Drawings and paintings of bison, horses, cave-bears, reindeer, &c., have been found in the depths of unlit caves, difficult of access, and artificial lighting must have been used by the artists to do their work. Shallow stone lamps have been found, in which fat could have been burned. Reference was made to the lighting of Antioch in the fourth century, and to an order of a Roman Governor of Edessa in 505 that certain lamps were to be kept burning in the streets all night. In 1415 Sir Henry Burton, Lord Mayor of London, ordered householders to hang-out lanterns to light the streets between All Hallows' and Candlemas. Berlin appointed an Inspector of Street Lighting in 1682; and power to levy a rate for the lighting of London was granted in 1736.

An account was given of the discovery of gas, the early days of electricity, and the invention of the incandescent gas mantle, and then Mr. Colquhoun dealt with the increase in the lighting of towns and cities during the past fifty years. The following figures, he said, refer specially to Glasgow, but in a general way they also apply more or less accurately to all the cities of Great Britain.

Public Lighting Bill of Glasgow.

1875	£34,000
1923	£292,500

The latter figure is eight-and-a-half times the cost in 1875, while the lighting value has increased about 33 times.

Finally Mr. Colquhoun, with the aid of diagrams, explained modern methods of measurement.

Wellman Mechanical Gas Producer.

An illustrated article in "Engineering" for the 9th inst. was devoted to the new model Wellman mechanical gas producer of the Wellman Smith Owen Engineering Corporation, Ltd., of Willenhall. This is made in two sizes; the larger type possessing an efficient gasifying capacity ranging from 2500 up to 4000 lbs. of bituminous coal per hour, and the smaller pattern from 1500 to 2750 lbs. The most desirable fuel would contain from 30 to 40 p.ct. of volatile matter, 50 to 60 p.ct. of fixed carbon, and less than 15 p.ct. of ash fusing at 1200° Fahr. or over. With this fuel the overload capacity of the larger producer is stated to rise to 4500 lbs.; and this capacity can, thanks to the automatic operation, be maintained continuously. Many producers of this new pattern are in use. The peculiar movement of the mechanical poker is one of the distinctive features of this producer. This movement extends down into the combustion zone. The poker is at work all the time, keeping the fuel free and loose, maintaining a fuel bed of uniform density, preventing the clinkering of the walls, and forcing any incipient clinker down into the ash pan.

A New Year-Book.

Almost every business and trade must by now have its own year-book, and many of the professions as well. Their value in all cases is acknowledged, and the Accountancy and Secretarial professions will, we feel sure, give a hearty welcome to a new volume which has been published for them by Messrs. E. & S. Livingstone, of 16-17, Teviot Place, Edinburgh, who have favoured us with a copy. A glance at the list of contents reveals at once much that will be interesting to both accountants and secretaries. A feature of the work is a series of articles, by acknowledged authorities, which form a review of the past year as regards many subjects which concern those for whom the work is compiled, and which make very instructive reading. Details of Societies and Institutes, and the qualifications for membership, are set out for ready reference, and a special section is devoted to training facilities which are available for those desirous of entering the two professions. A summary of law cases during the last year, of special interest to company secretaries and accountants, is a useful feature. The volume, which is published at 10s. 6d., or 10s. 11d. by post, contains a great deal of information of all kinds which should appeal to every up-to-date business man, as well as to those for whom it is specially written, and will doubtless prove extremely helpful to prospective accountants and secretaries, and those whose business it is to advise or train them. We feel we may confidently congratulate the publishers on the certain success of their first issue, which will no doubt be followed in due course by many others.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Re the Protection of Gas Investors.

SIR,—Referring to your numerous editorial articles regarding the activities of company promoters trading on the promotion or development of gas-works, I do feel that thanks are due to you for airing these schemes. From the information you give, it is very evident that the only ones who could possibly profit in any way would be the promoters. Such schemes as these, if successful, are certainly not going to assist in establishing public confidence in gas investments, and small and little-known undertakings are especially going to suffer when endeavouring to raise capital.

I find the public are very ignorant about matters of gas management—in fact, there are people who imagine anybody can run a gas undertaking—and it is this ignorance which speculating company promoters can trade upon. It is surely time the public were educated differently, or that they were safeguarded by a certification of validity being endorsed on the prospectus announcing new capital issues.

Perhaps it would be possible for a scheme to be evolved whereby gas undertakings, when issuing new capital, would find it necessary to state they are members of the National Gas Council. Further, it would assist in the inquiries of possible investors in gas stock if the officials of an undertaking who are members of the Institution of Gas Engineers would state so on any document published in connection with capital issues. Anybody can call himself a gas engineer, which is very vague, and does not give the information usually looked for.

R. E. TAYLOR, Engineer and Manager.

Haslemere and District Gas Company,
Surrey, Jan. 19, 1925.

Critical Study of Tests on Water Gas Plant.

SIR,—I wish Dr. Parker would leave side issues alone, and deal with the only material issues between us. Perhaps I have not defined them sufficiently clearly, but they may be stated as follows:

(*a*) The system of thermal and chemical balances which he uses gives no indication as to whether the results are accurate or the reverse. The whole object of my paper was to discuss a system which has not this defect.

(*b*) The conclusion arrived at in the Tenth Report of the Gas Investigation Committee of the Institution of Gas Engineers is misleading. The fact that a higher yield of gas was obtained in Experiment D of that report than in the experiments described in the Sixth Report has nothing to do with the fuel bed being lower in Experiment D than in the experiments of the Sixth Report.

I have given the grounds upon which I employed certain data in my calculations; Dr. Parker gives no data supporting the values which he uses. The indirect evidence of the specific gravity determination is of little value, for the following reason: Coke is a vesicular substance, and even when very finely ground will still remain vesicular. The value given for the specific gravity is the *apparent value*, which must be lower than the true value. Some five years ago, when in Washington, I saw an experiment carried out in the Geophysical Laboratory by Prof. Hewlett, of Princetown, which throws some light upon this fact. He had been attempting to determine the specific gravity of some form of amorphous carbon, and had found that the carbon absorbed water continuously over a period of months; the apparent specific gravity increasing at the same time. He therefore applied to the carbon-water mixture a pressure of some thousands of atmospheres, when a marked and apparently final increase in the absorption took place. I do not know what the final value arrived at was, and I believe that, on account of Prof. Hewlett's illness, the result was not published. I have not been able to trace reference to it. What is wanted is an investigation of coke carbon; and until this work is carried out, it is of very little use discussing the matter.

Dr. Parker must realize that, following the experimental work which has been carried out by the Fuel Research Board and by the Institution of Gas Engineers, the next step in advance must consist in such an attempt to generalize as I have made, simplified as far as possible by the elimination of unimportant factors. Such I have considered the moisture in the coke to be, and Dr. Parker's statement that it is carried away by the first blow after charging confirms my view, but not his own. It merely means that the temperature of the blow gas in the particular blow would be abnormally low. The hydrogen in the blow gas can be made the subject of a small correction which is easily applied. It is of no use to sit down and lament the complexity of the water gas process in detail, which I have never denied; we have got to get on with the study of it on scientific lines.

M. W. TRAVERS.

147, *Queen Victoria Street, London, E.C.,*
Jan. 15, 1925.

Reduction in Price at Dundalk.—The Dundalk Gas Company announce a reduction in the price of gas by 5d., bringing it to 5s. 5d. per 1000 c.ft. A discount is allowed of 20 p.ct. when gas is used for power.

Hoylake Gas and Water Purchase Scheme.—The ratepayers of Hoylake and West Kirby, in public meeting, have expressed approval of the proposal of the Council to acquire the undertaking of the Gas and Water Company. Explaining the various clauses of the Bill which is being promoted to give effect to the scheme, Mr. Roderick Williams (the Clerk to the Council) expressed the opinion that never again would there be an opportunity of acquiring the works at the price of £187,000 now agreed upon. Mr. Arthur Collins (financial expert) had advised the Council that the proposal was a sound one.

REGISTER OF PATENTS.

Gas-Cooker Ovens.—No. 226,045.

WILLIAMS, G. B., of Crowthorne.

No. 585; Jan. 9, 1924.

The patentee's object is to prevent the products of combustion escaping too quickly from the oven; and he proposes to cause their circulation and check their escape by an attachment at the back of the cooker. The attachment consists of a plate fitted parallel to the cooker back, forming a channel into which the products escape through a cut-away portion of the upper part of the back plate proper. The channel is open at the bottom, but there is provided a conical flue pipe which will collect the products. The specification describes and illustrates the arrangement, and also the method of applying it to a cooker during manufacture.

Retort-Oven Batteries.—No. 211.828.

KOPPERS COMPANY, of Pittsburgh (Assignees of J. VAN ACKEREN).

Convention date, Feb. 23, 1923.

No. 22,704; Sept. 10, 1923.

Specification No. 191,393 [see "JOURNAL" for June 25, 1924, p. 908] described and claimed a retort oven battery in which some of the regenerators communicate with the tops of the vertical flues of pairs of heating walls, and the other regenerators communicate with the bottoms of the flues. Specifications Nos. 201,130 ["JOURNAL," *ibid.*] and 210,085 claimed a retort oven battery of similar type in which the regenerators are segregated into larger groups of inflow and outflow regenerators respectively, each group serving the flues of more than one pair of heating walls in the row, and in which the regenerators are directly connected at the top and bottom respectively with only some of the heating walls, the other heating walls being served by ducts extending round the end of the retorts remote from the regenerators and leading from one heating wall to another.

The objects of the present invention are to obtain this greater "regenerator segregation" of the battery while avoiding feed duct connections leading from one heating wall to the other, and also to render the duct connections in a simpler and more symmetrical manner.

The invention consists broadly in the combination, in a battery of the first-mentioned type, of vertically flued heating walls disposed in a row along one side of the battery, reversible regenerators disposed in a row alongside the retorts and at the other side of the battery with segregation into alternating groups of the inflow and outflow regenerators serving at least two pairs of heating walls, and direct duct connections leading from the tops and bottoms of all the heating walls to the corresponding regenerators, all such connections being at the same end of the heating walls.

Furnace Linings.—No. 225,012.

GIBBS, F., of Ilford.

No. 24,692; Oct. 4, 1923.

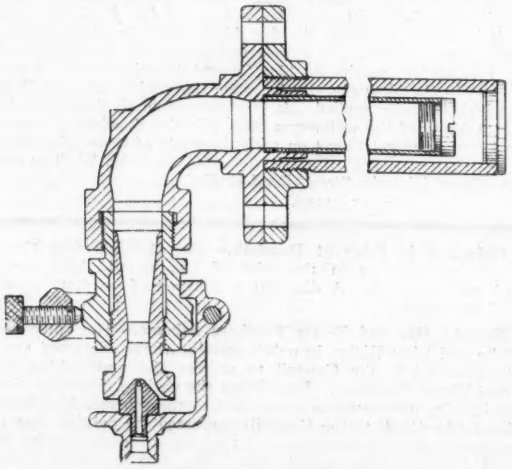
According to the general principle of this invention furnace linings are made with tubular passages which may be vertical, horizontal, or angular, and may intercommunicate if desired. The object is to promote economy of fuel and prevent boilers, &c., from being burnt out.

Gas Burners.—No. 225,388.

RADIATION, LTD., of Birmingham, and BRAYSHAW, S. N. & E. R., of Manchester.

No. 30,865; Dec. 8, 1923.

This invention relates to atmospheric gas burners intended for bakers' ovens, though applicable to other purposes. It comprises two concentric tubes with an inner chamber between them. The inner tube is fitted with a venturi throat and provided with a series of holes. The outer tube has a number of slits. The venturi throat is adjustably fitted to a bracket or socket fitted on the elbow bracket at the end of the inner tube, so that its position can be adjusted in relation to the gas jet. The accompanying illustration, which is a section of the burner, shows the construction.



A Gas Burner for Bakers' Ovens.

Prepayment Gas Meters —No. 225,657.

GEORGE WILSON GAS METERS, LTD., and WILSON, J. H., both of Coventry, and POOLE, D. C. E., of Baginton.

No. 24,617; Oct. 3, 1923.

The object of this invention, relating to prepayment gas meters and the like, is to provide an arrangement whereby the inlet valve, together with its supporting arm and operating spindle, may be removed and replaced intact without involving the necessity for resetting the parts of the mechanism or the aid of a screw driver, soldering iron, or expert labour.

The main feature is that the stuffing box in which the inlet valve operating spindle works is carried by a removable plate or disc which makes a gas-tight joint over an orifice formed in the wall of the inlet valve casing. This orifice is of such diameter as will permit of the withdrawal therethrough of the spindle together with the inlet valve connected to it without disturbing their relative positions and without affecting the spindle operating mechanism.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Jan. 14.]

Nos. 242-866.

ASHMORE, BENSON, PEASE, & CO., LTD.—"Device for closing joints. No. 416.

CRASTIN, C.—"Gas burners for heating." No. 810.

DEMPSTER & SONS, LTD., R.—"Apparatus for manufacture of coal gas." No. 567.

DURAND, E.—"Gas, &c., valves." No. 711.

FROST, A. E.—"Valve for gas retorts." No. 846.

GASIFIER COMPANY. "Process for gasifying liquid fuels." No. 497.

HEADON, J. T.—"Gas fires." No. 670.

HELPS, G.—"Gas burners." No. 529.

KEITH, G., AND KEITH & BLACKMAN COMPANY, LTD., J.—"Non-return gas supply valve." No. 412.

KEITH, G., AND KEITH & BLACKMAN COMPANY, LTD., J.—"Wire nets for lamp globes." No. 413.

LYNCH, H. L.—"Gas burners." No. 264.

MARKS, E. C. R.—See Gasifier Company. No. 497.

PICKLES, H. J.—See Ashmore, Benson, Pease, & Co., Ltd. No. 416.

SHANNON, J.—"Atmospheric gas burners for cooking and heating." No. 260.

SHAW, A. G.—"Dry gas meters." No. 358.

SIEMENS-SCHUCKERTWERKE GES.—"Electric gas purifying plants." No. 516.

TOOGOOD, H. J.—See Dempster & Sons, Ltd., R. No. 567.

Farm Experiments with Sulphate of Ammonia.

An interesting report by the Rodbaston Farm Institute of the Staffordshire County Council has just been issued on the results of farmyard manure and chemical manure experiments on crops. A demonstration was carried out to show the effect of artificial manures, particularly sulphate of ammonia, on potatoes grown with a light dressing of farmyard manure (about 10 tons to the acre). The variety used in the trial was King Edward, once grown, from Scotland. With farmyard manure only, the total crop of potatoes was only 4 tons 2 cwt. per acre. The application of an incomplete mixture containing only phosphates and potash failed to produce any increase over the plot receiving farmyard manure only; but the application of 1½ cwt. of sulphate of ammonia produced an increase of over 2 tons of potatoes per acre, while with 3 cwt. of sulphate of ammonia the increase was 3¾ tons to the acre. The following were the results of an experiment in the manuring of mangolds. The crop grown with farmyard manure only yielded 18 tons 18 cwt. to the acre. The standard dressing of nine ½-cwt. complete artificials per acre doubled the crop. All the artificial manures proved extremely profitable, especially those containing nitrogen and phosphates. A mangold variety trial was also conducted. The manures applied per acre were as follow: 20 tons of farmyard manure, autumn application; 2 cwt. of superphosphate, 30 p.ct.; 3 cwt. of steamed bone flour; 3 cwt. of kainit; 1 cwt. of sulphate of ammonia, and 1½ cwt. of nitrate of soda as a top dressing. The yields varied from 41 tons 18 cwt. to 25 tons 13 cwt. per acre. Nitrogen was the most important ingredient in the complete manure for seed hay. The effects of successive applications of nitrate of soda as a top dressing for field cabbage were demonstrated, the average increase of crop, due to 3 cwt. of nitrate of soda, costing 42s., being 5 tons 9 cwt.

A "Pretentious" Electricity Scheme.—A scheme for an electricity supply to Bridport, Chard, and district has been dropped after opposition from Chard, where the Corporation own the gas-works, and several other towns in the area. The Chard Town Council have received a report from the Electricity Commissioners stating that, after careful consideration of all the circumstances, they had decided not to proceed with the application of Mr. Royce for a Special Order for the scheme. Mr. G. W. S. Hawes (the Borough Engineer) believed the Chard objections were the main instrument in the deposing of a pretentious scheme. Evidently the promoters could not provide the technical particulars and estimates which the Chard objectors demanded, and consequently the Commissioners would not allow the matter to proceed. The Mayor (Alderman A. E. Townsend) said it was a very good thing they had decided to oppose the scheme.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following further notices regarding applications to the Board of Trade under the Gas Regulation Act.

DECLARATIONS OF CALORIFIC VALUE.

Guisborough Gas Company, Ltd.—500 B.Th.U. (March 25.)
Hindley Urban District Council.—475 B.Th.U. (April 1.)

CONTRIBUTION TO THE GAS FUND.

In pursuance of the powers conferred upon them by section 7 of the Gas Regulation Act, 1920, the Board of Trade hereby prescribe that:

1.—The rate of contribution to the Gas Fund for the year 1925 shall be one shilling and threepence for each million cubic feet of gas sold during the year 1924.

2.—Such contribution shall, on or before April 1, 1925, be paid to the Board of Trade at Great George Street, London, S.W. 1, by any gas undertakers with respect to whom an order under the said Act shall have been made, by cheque made payable to the "Assistant Secretary for Finance, Board of Trade," and crossed "Gas Fund Account."

STOCKTON AND THE HAVERTON GAS-WORKS.

A Poll to be Taken.

Consequent upon the voting at a recent ratepayers' meeting, when, through Labour influence, the main proposals of a Bill to be promoted were negatived, the Stockton Town Council decided last Friday to take a poll of the electorate upon the rejected clauses. The chief of these have reference to the purchase of the Haverton Hill Gas-Works.

The Town Clerk stated that there were about 148 electors at the public meeting, whereas the total number was 25,332. He said the cost of a poll would not be less than £300, and might amount to £400.

A Labour member moved that in the poll the clauses relating to the gas-works purchase should not be included; but he afterwards withdrew the amendment, saying it would be a waste of time putting it.

The resolution to take a poll was carried by 31 votes; the 8 Labour members not voting.

NEWCASTLE COUNCIL AND THE GAS SUPPLY.

At the last meeting of the Newcastle City Council, Sir George Lunn moved the confirmation of a further report of the Parliamentary Committee relative to the proposed transfer to the Newcastle and Gateshead Gas Company of the Walker and Wallsend and the Chester-le-Street gas undertakings. It had been asked, he said, that the acquisition of these two companies should not in any way prejudice Newcastle consumers of gas, and the Directors of the Newcastle and Gateshead Company had given a declaration to this effect. It had been agreed that, at the end of five years from the coming into operation of the Order, the Company were to cease to make any differential charge for gas in Walker, and thereafter the price and other conditions applicable to consumers in the parish of Newcastle were to apply to the whole city, including Walker. The charge for gas in Newcastle was now 8·6d. per therm, and in Walker 9·4d. per therm. The Company agreed that they would, as from the date of the transfer of the Walker Company, make charges for gas supplied for street lamps, Corporation buildings, and other similar purposes throughout the whole city, at the same rates as those for the time being charged in Newcastle; and that a discount from those charges at a rate of 20 p.ct. would be made in respect of the whole city so long as the differential scale of charges in Walker continued to operate. This meant that £12,000 per annum would be received by way of discount from the Gas Company. The charge of £5 a lamp for the provision of new street lamps at Walker had been abolished, and the charge for removing lamps at Walker had been reduced from 30s. to 15s.

In seconding, Alderman W. Bramble said the Parliamentary Committee had made a very good bargain with the Gas Company.

The Order was criticized by Mr. Martin Connolly, M.P. for East Newcastle, who said the Birtley district was very badly hit by it. The Birtley Coal and Iron Company had produced gas themselves, and were now buying it in bulk from the Newcastle Company, and supplying it to the Birtley population under the provisions of this Order. The Birtley people remained under the Birtley Coal Company, but the Chester-le-Street people, who were farther away from Newcastle, received their gas direct from the Gas Company, at a much lower rate than the Birtley people had to pay.

Sir George Lunn pointed out that Newcastle could undertake no responsibility for Birtley, who had their own authority to safeguard their interests.

Mr. Walter V. Longfield congratulated the Parliamentary Committee upon what they had done.

The report was adopted.

PROFIT-SHARING AND CO-PARTNERSHIP.

Evidence Before Committee on Industry and Trade.

At a meeting of the Committee on Industry and Trade, which was held at the Board of Trade on Jan. 7, evidence was submitted on behalf of the Labour Co-Partnership Association by Colonel J. H. Boraston, Director of the South Suburban Gas Company, and Mr. Cuthbert Plaistowe, the Hon. Secretary, and Mr. E. W. Munday, the Secretary, of the Association.

The witnesses contended that one of the main causes of industrial unrest was the feeling among the workers that they were not getting an adequate share of the production on which their labour was expended, and the witnesses accordingly advocated schemes of profit-sharing which gave the workers a definite portion of the ultimate profit of the business. They laid stress on the necessity of any such scheme being accompanied by some form of joint council at which the interests of the workers could be officially stated. The Association, in short, advocated that all workers should share to some extent in the profits, capital, and control of the business in which they were employed; that the workers should receive, in addition to the standard wages of the trade, some share in profits and the economy of production; that the workers should accumulate their share of profit in the capital of the business, with the result that they would acquire a share of control (*a*) by acquiring share capital, and consequently the rights of shareholders, and (*b*) by the formation of a co-partnership committee of workers having a voice in the internal management.

GAS PRICE AND QUALITY IN NEW YORK.

A Weighty Opinion.

The Hon. James G. Graham, the Special Master to whom in recent years has been referred a great deal of the gas rate litigation in the United States Court for the Southern District of New York, lately filed his opinion and report in the action brought by the Consolidated Gas Company against the Attorney-General and other public authorities to adjudicate the unconstitutionality of a certain portion of the 1923 laws of the State of New York, and to restrain the defendants from any efforts to enforce the dollar rate and 650 B.Th.U. standard prescribed by that Statute.

The report sustains generally the contentions of the Company, and determines, on a number of grounds, the invalidity of both the rate and the standard provisions. Opportunity will be given to Counsel for the parties to submit objections and propose amendments, after which the Special Master will prepare a final opinion and report, and make his recommendation for judgment. So far, however, as basic principles of law are concerned, it is regarded as unlikely that the final report will differ much from the tentative form now made public. It is expected, whatever the outcome, that the case will be carried to the United States Supreme Court. Broadly speaking, the present report upholds the integrity and soundness of the Company's operations, the good judgment and good faith of their trustees and officers, the reasonableness of their outlays and of the prices paid, and the economy and efficiency of their working costs. No reason, therefore, is found for interference with the judgment of the Company's officers and trustees.

The Special Master finds that 8 p.ct. is a rate customarily required in the locality to be earned on the present value of the property of a regulated public utility undertaking, and that the Company should be permitted to earn at least this amount. The present level of prices is no longer abnormal or temporary, but is, and for a long time to come will be, the normal one. He can see no reason for believing that the future will bring any substantial reduction below the 1923 costs. The Special Master follows the ruling of the District Court, that the requirement of the furnishing of gas of not less than 650 B.Th.U. for a rate of not more than $1 per 1000 c.ft. is a single and inseparable provision, and that the rate limitation and the 650 B.Th.U. requirement are each and both unconstitutional, confiscatory, and void. As to the "improper and dangerous character" of the 650 B.Th.U. requirement, the Special Master says evidence was given by the defendants' expert engineer witness to the effect that the Company cannot make gas which will deliver to every consumer a minimum of 650 B.Th.U., whether it be water gas, coal gas, or a mixture; that if such a standard were furnished it would be uneconomical, and the consumers would not get so much for their money; and that it would be "hazardous to life and property." The Special Master goes on: "I think it can be safely found that the enforcement of the 650 B.Th.U. standard would be in effect a confiscation of the coal gas plant of the Company, and render it impossible to operate it under such standard, and would make it unsafe and hazardous to life and property to operate even the water gas plants thereunder, and would be uneconomical, wasteful, and give very poor results to the consumers, as well as increasing the cost of making such gas some 4·79c. per 1000 c.ft. The Statute also provides that it should go into effect immediately, while the uncontradicted testimony is that it would require at least from six to nine months for the plaintiffs to change the consumers' apparatus so as to be regulated for gas of this standard."

Wolverhampton Price Reduced.—The Wolverhampton Gas Company announce that, as from the last reading of the meters, the price of gas is to be reduced as follows: For manufacturing purposes, up to and including 100,000 c.ft. a month, 6·44d. per therm; in excess of 100,000 c.ft. up to 500,000 c.ft., 6·22d. per therm; in excess of 500,000 c.ft. and up to 2,000,000 c.ft., 5·55d. per therm; and over 2,000,000 c.ft., 5·33d. per therm. For lighting and general purposes, up to and including 100,000 c.ft. a quarter, 9·27d. per therm; in excess of 100,000 c.ft. up to 250,000 c.ft., 9·05d. per therm; in excess of 250,000 c.ft. up to 1,000,000 c.ft., 8·83d. per therm; and over 1,000,000 c.ft., 8·61d. per therm.

ST. PAUL'S CRUMBLING STATUES.

Stonework Turned to Powder by Smoke from London Chimneys.

"Like the Houses of Parliament, Westminster Abbey, and all the other buildings that should be the pride of Londoners, St. Paul's is being sacrificed to our obstinate adherence to the coal-burning habit," said Dr. J. S. Owens, Consulting Engineer and Hon. Secretary of the Advisory Committee on Atmospheric Pollution, discussing the safety of St. Paul's Cathedral.

"It is true," he went on, "that the most important feature of the present trouble—the weakening of the piers that support the dome—cannot be ascribed to London's atmosphere. But there can be no doubt that the crumbling of the outside stonework is due directly to atmospheric pollution. Anyone can see from the top of a 'bus the damaged fingers of many of the statues, which are being rapidly disintegrated into something like a powder. I have frequently observed that even interiors of buildings are affected by smoky air. The cloisters of Westminster Abbey, for instance, have been appreciably damaged by the atmosphere. We burn in London 17,000,000 tons of coal every year, and out of every ton burnt 20 to 100 lbs. enterge into the air in the form of soot deposits, while domestic coal fires, and, to a lesser extent, factory chimneys, shoot from 200 to 300 tons of sulphuric acid into the air every hour. These 300 tons of sulphuric acid could, in time, convert about the same weight of limestone into dust. We live in a constant cloud of smoke. It is high time that it was made a penal offence in our towns to poison the atmosphere with coal smoke. One of the best remedies, and the one to which we are gradually, but much too slowly, tending, is the replacement of coal heating by gas heating, or the replacement of smoky coal by semi-coke. Perhaps the only really effective method of eliminating coal smoke from the air would be to adopt the suggestion of Sir Napier Shaw, and give a rebate off the rates to every householder who made no smoke."

SOCIAL ACTIVITIES AT IPSWICH.

Opening of Workmen's New Recreation Hall.

A pleasant function at Ipswich last Wednesday evening was the opening of the new Workmen's Recreation Hall by Mr. Henry Woodall, the Chairman of the Company.

In his opening remarks, the Chairman said he was pleased to meet the employees once again, and thought that probably they were also pleased to meet him, seeing that on the previous occasions on which they had met it had been his pleasure to introduce schemes and suggestions for the improvement of the conditions and recreations of the employees. He referred to the occasions on which he had opened the sports ground, and the dinner at which he had informed them of the highly beneficial schemes of co-partnership and superannuation. He then went on to say that the Company, on finding they had the space available, decided to build this hall, which could be used for whist drives, dances, lectures, and other functions of a like nature. The hall would also accommodate the library, which he understood was quite flourishing, and which had hitherto been carried on in a rather inconvenient situation.

The Engineer (Mr. Frank Prentice), on behalf of the employees, thanked the Directors for providing this excellent hall for their recreation. They, as employees, ought to do the very best they could, both for the sake of the Directors who treated them so well and for the town which they served. They were out to give the town cheap gas, and this could only be done by the co-operation of all the employees. They had competition to meet in oil and electricity, and at present were holding their own very well; but such a satisfactory state of affairs could only continue by the men getting every possible cubic foot of gas out of the coal, and by saving every minute they could on their jobs. He reminded the men that the Company provided them with their food, their clothes, their homes, and, under their excellent superannuation scheme, with provision for their old age. They owed a very great deal to the Company, who did everything possible for their well-being.

The General Secretary of the Sports Association (Mr. F. Baylis) then read a report of the year's working—including bowls, quoits, tennis, football, and cricket. All the sections were in a flourishing condition. He referred to the inter-company bowls and tennis tournaments played against the Norwich gas undertaking last summer. The Ipswich tennis and bowls teams visited Norwich, and although beaten at bowls, were superior to Norwich at tennis. Later, the Norwich players visited Ipswich, when the same results were obtained. He also alluded to the excellent way in which the Hon. Librarian (Mr. W. P. Cadman) performed his duties. The library was formed by voluntary contributions, and at present consisted of about 300 volumes. They were deeply indebted to Mr. P. W. Cobbold (one of the Directors) for his valuable gift of 90 volumes.

The opportunity was taken to present the trophies and prizes to the winners of the various tournaments, &c., held last season. It may be explained here that the Directors of the Company have presented for annual competition three silver cups—one for bowls, one for tennis, and one for quoits. The competitions are conducted on the handicap principle, and the winners, in addition to holding the cup for the year, also receive a silver replica. A championship competition is also held in each section, the winner of which receives a gold medal, and the runner-up a silver one. Medals are also awarded to the players in the cricket section obtaining the best bowling and the best batting average. In addition, a record of the winners' names is kept on an "Honours Board."

The hall is situated above the new offices and stores, and is about 40 ft. by 30 ft. A well-proportioned stage is situated at one end, while the equipment includes the now indispensable wireless set. There is no doubt that this excellent addition to the recreational side of the gas workers' activities will be much appreciated; and the Directors are to be congratulated upon their practical interest in the welfare of their employees.

TRADE NOTES.

Tools for the Workshop.

The Billing Tool Company, No. 303, High Holborn, London, W.C.1, have issued a handy little list (No. 20) of workshop equipment such as lathes, saws, drilling machines, and general engineering tools.

"Simplex" Carburetted Water Gas Plant.

A "Simplex" carburetted water gas plant was brought into operation at the Maybole Gas-Works last week. The Vertical Gas Retort Syndicate, Ltd., No. 17, Victoria Street, S.W.1, have now received an order for a similar plant for the Kinross Gas-Works.

Thermo-Electric Pyrometers.

An excellent and concise list of thermo-electric pyrometers, which will be useful to all who have anything to do with industrial heating processes, has been published by the Cambridge Instrument Company, Ltd., No. 45, Grosvenor Place, London, S.W. 1. The different types of pyrometer and recorder manufactured by the Company are well illustrated and clearly described. Of special interest is the "Cambridge" pyrometer tester—a simple, inexpensive potentiometer suitable for checking the accuracy of any type of thermo-electric pyrometer.

Pan Ash Separating and Coke Breeze Washing.

Evidence of the favour which the patent "Retriever" pan ash separating and coke breeze washing plant of Messrs. George Waller and Son, Ltd., of Stroud, is meeting among gas engineers is to be found in the fact that recent installations have been made at the following gas-works: Batley, Burnley, Farnworth, Kettering, Melbourne (Australia), Middleton, Morley, Shipley, Spenborough, and Walsall. The firm have also in hand machines for the following works: Burton-on-Trent, Chorley, Colne, Stretford, and Warrington. Messrs. Waller state that the plant is proving very efficient in the recovery of coke from pan ash and the washing of coke breeze.

CONTRACTS OPEN.

Ammoniacal Liquor.

The Gas Committee of the Stafford Corporation are desirous of selling the ammoniacal liquor produced at their gas-works. (See advert. on p. 160.)

Coal.

The Gas Committee of the Borough of Yeovil are inviting tenders for from 1000 to 5000 tons of coal over a period of six months commencing on June 1 next. (See advert. on p. 160.)

Surplus Tar.

The Directors of the Slough Gas and Coke Company are open to receive tenders for their surplus crude tar; the estimated quantity for sale being 50,000 gallons. (See advert. on p. 160.)

Pipes and Specials.

Tenders are invited by the Gas Committee of the Marple Urban District Council for 3700 yards of 6-in. and 950 yards of 4-in. S. and S. main pipes, together with the necessary syphons, bends, tees, and other specials. (See advert. on p. 160.)

EXTENSIONS.

Borrowing Sanctioned at Hebden Bridge.

Following a recent public inquiry, the Hebden Bridge and Mytholmroyd Gas Board have received the sanction of the Ministry of Health to borrow £9600 for the installation of coal plant and vertical retorts at the works.

Limerick Gas Plant.

The Limerick Corporation are asking the Free State Ministry of Industry and Commerce for a loan of £30,000 for the installation of new carbonizing plant and extension of mains.

Thornton-le-Fylde.

The Unemployment Grants Committee have sanctioned a grant for gas-works extensions.

A Useful Calendar.—Messrs. George Waller and Son, Ltd., have forwarded a wall calendar with card date-block and container. It is illustrated by a photographic view of the "Retriever" pan ash and coke breeze washer. Acknowledgments of other diaries and calendars have appeared in our three previous issues.

Llandrindod Wells Council and the Gas-Works.—At a meeting of the Urban District Council of Llandrindod Wells last week, the question of the exercise of the rights of the Council with regard to the Gas Company's undertaking was introduced. Mr. G. W. Gibson was informed that the Council had the right of purchase by agreement, provided six months' notice was given, in 1928. The Chairman and other members expressed the view that the matter should be seriously considered during the next few months, and the Clerk to the Council undertook to prepare all the information.

Unemployment Grant at Middlesbrough.—The Unemployment Grants Committee have written the Middlesbrough Corporation, in reference to an application for a grant in connection with the erection of a new holder, stating that, in view of assurances given that the work would not normally be put in hand until 1927 or 1928 at the earliest, the Committee are prepared to accept the scheme for the purpose of a grant of 50 p.ct. of the interest, for a period of fifteen years, on approved expenditure out of loan. One of the conditions laid down is that the work shall be actively begun by the 31st inst. The letter adds that for the present the approval of a grant must be regarded as applying only to the construction and erection of a holder at an estimated cost of £55,000. As regards subsidiary works included in the complete estimate, the Committee are in communication with the Ministry of Health.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

There is again no change to report in this market, and, while on the surface matters appear to be stationary, a continuance of present conditions must in reality mean a steady accumulation of losses to a good many collieries. Buyers are still covering their requirements from hand to mouth, and the present position may be described as steady for this month, with an easier tendency for February.

Unfortunately, few people can agree with the Labour leader who recently declared locally that it is nonsense to talk of foreign competition in the coal trade, because, even in 1922 only 113 tons of coal were imported into this country from Germany! As a matter of fact, German competition shows no signs of abating, and c.i.f. offers of English coal to Continental buyers, at cut prices, are constantly being lost to German offers at considerably lower figures.

Durham unscreened steams for bunkers have been a fairly good market, up to 20s. f.o.b. having been paid for prompt. Wear Special gas makes quote 22s. to 22s. 3d., but are not very strong at this figure. Holmside and similar best qualities, however, remain steady at 21s. 6d. Other gas qualities are plentiful at 18s. to 18s. 3d. Coking unscreened are a poor market, and best sorts do not fetch more than about 18s. 6d.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

The gas coal market is very dull. Reserves are so fully maintained that little attention is being paid to spot lots. The tone is rather more active as regards house coal and industrial grades. No appreciable change in values has occurred. With few exceptions pits have been making full time. The balance is fairly maintained between supply and demand. There is no deficiency and no superabundance, open weather prevailing to avert stringency in the domestic trade. The agitation in Derbyshire has been unattended with any repercussions on the market, for the reason that no doubt was ever entertained as to the ability of other districts to make good any deficiency in soft coal from the area affected. Borings in various parts of the Midlands are bringing hitherto untapped sources definitely within reach. In addition to the new seam struck at Trowell Moor, in the Erewash Valley, where the Cossall Company's property lies, two seams are reported to have been found near the surface at Ilkeston, excavations under the market place having disclosed them.

Furnace coke is very firm. The break in the stabilization arrangement between Midland blast-furnacemen and the cokeries does not appear to endanger the trial of purchase according to analysis.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

Gas coals under contract are moving more freely, but "spot" sales at lower figures are at a discount, owing, perhaps, to the slump in the shipping market. This, by the way, shows no sign of improvement, owing to the continuance of German competition and the high rates of exchange which still prevail.

Furnace coke for export advanced in value for a week or two, but has now receded, and is at an average price of 22s. 6d. f.o.b. Humber ports. Gas coke has, however, fallen tremendously, and is now to be obtained at 22s. f.o.b., with few orders moving.

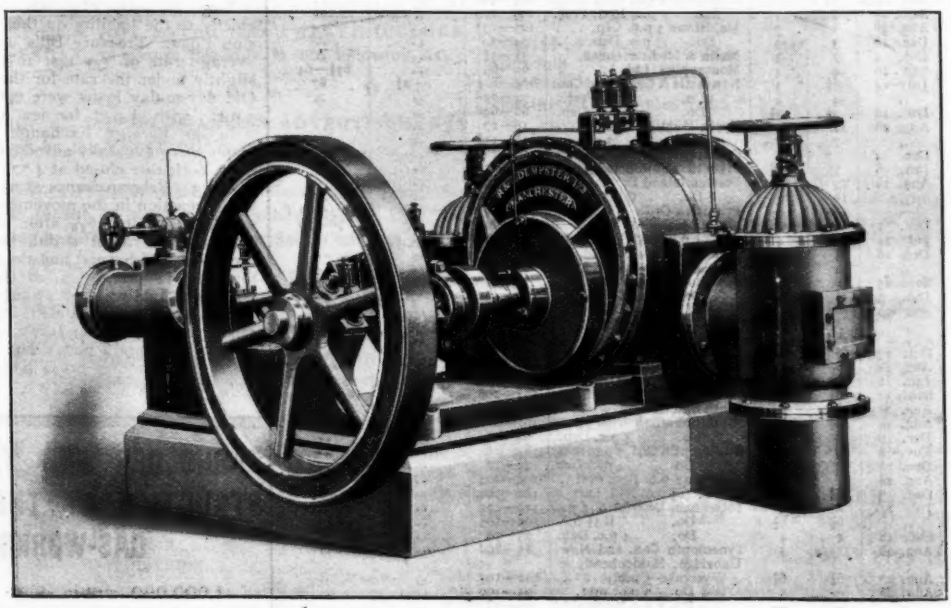
There is a better tone in regard to house coal, although the trade being done is nothing like what is anticipated at this time of the year, and many collieries have accumulated small stocks. The present situation suggests that prices will remain stationary throughout the winter.

The industrial outlook shows no material sign of improvement, although it is anticipated that by the beginning of spring there should be an upward movement. Prices in the meantime vary according to the situation of the supplying colliery. The commoner fuels for spot lot sales are not commanding recent figures.

Prices at Hull at the week-end were: Bunkers—Yorks, Derby, and Notts large screened steam, f.o.b. Humber ports, 17s. 6d. to 19s. 6d. Cargo for export, f.o.b. usual shipping ports—Best Yorks hards, Association, 22s. 3d. to 22s. 6d.; Derby best hards, 22s. 3d. to 22s. 6d.; West Yorks Hartleys, 18s. to 22s.; South Yorks washed doubles, 21s. 6d. to 23s.; South Yorks washed singles, 21s. 6d. to 22s.; dry doubles, 16s. 6d. to 18s.; South Yorks washed smalls, 16s. 9d. to 17s. 3d.; Derby slack, 1 inch, 12s.; South Yorks rough slack, 12s. 3d. to 12s. 6d.; gas coke, 24s. to 27s. 6d.; foundry furnace coke, 23s.; washed smithy peas, 22s. 6d. to 25s.; washed steam thirds, 20s. 6d.; South Yorks washed trebles, 23s. Prices in Lancashire remain unchanged.

New Houses and Gas Main Extensions.—Mr. Lumb referred, in the Blackpool Council last Wednesday week, to a minute recording that the Gas Engineer had reported having received application for a supply of gas to houses some distance from existing gas mains, and deciding not to entertain these applications. Mr. Lumb pointed out that in many new houses there were no kitchen ranges, and people now without a gas supply were unable to do any cooking. Some attention should be paid to the matter. The Mayor said the Chairman of the Gas Committee had promised to give the matter careful attention. Mr. Lumb: In some cases houses nearly a year old are still without gas. The Mayor remarked that the Gas Committee would bear the discussion in mind, and accelerate the work of laying mains.

ROTARY EXHAUSTERS



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STOCK MARKET REPORT.

DEPRESSED conditions prevailed on the Stock Exchange last week, and there was no indication of the previous optimism. Although no actual slump occurred, buyers were in the minority, and profit-taking operators were rarely successful in finding purchasers. Contrary to expectations, the satisfactory agreement arrived at by the Allied Conference in Paris had no effect on Government Stocks. The steady stream of new issues is doubtless partly the cause of the reduction in the number of transactions. The principal among these is the important issue of the London Midland and Scottish Railway of £7,500,000 5 p.ct. redeemable preference at par, which, it is anticipated, will be considerably oversubscribed. There were, of course, exceptions to the general depression, and Insurance shares and Tobaccos were well supported.

An important change in the price of Gas Stocks is the rise of 2 points in the Gas Light and Coke ordinary to 97-99; and it will also be noticed that Newcastle consolidated jumped 2¾ points at the local Exchange. Although it is not expected that there will be any falling off in the dividends shortly to be announced by gas companies, investors with a knowledge of the industry anticipate that the past year's accounts will not, owing to the high cost of coal and the fall in the price of residuals, show the usual good results.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 4 p.ct. debenture 63 *ex* div., Bombay 5⅜, British 118, Cape Town 4½ p.ct. 1st mt. debenture 72½, Commercial 3½ p.ct. 95, Continental Union 41¼, 42, Gas Light and Coke 96, 96⅛, 96¼, 96⅜, 96⅝, 96⅞, 4 p.ct. preference 80¾, 3 p.ct. debenture 61¼, Imperial Continental 177½, 178, Liverpool 7 p.ct. preference 106, Montevideo 63½, 64, Primitiva 9s. 5¼d., 9s. 7½d., 9s. 9d., South Metropolitan 101, 101¼. Supplementary prices, Leatherhead new 4 p.ct. debenture 78.

On Tuesday, Alliance and Dublin 65, 66, 4 p.ct. debenture 64 *ex* div., Commercial 4 p.ct. 95⅛, Continental Union 41, Gas Light and Coke 96⅝, 97, 97¼, 4 p.ct. preference 81, Imperial Continental 180, Primitiva 9s. 6d., 9s. 9d., South Metropolitan 6½ p.ct. debenture 105, Swansea 6½ p.ct. debenture 103½.

On Wednesday, Alliance and Dublin 66, Bombay 5⅜, Brentford "B" 113, British 118, 7 p.ct. preference 125, Cape Town 4½ p.ct. preference 6½, Commercial 4 p.ct. 95⅛, 95⅜, Gas Light and Coke 96¾, 97, 97¼, 97½, Imperial Continental 179, 179½, 180, Primitiva 9s. 3d., 9s. 6d., 9s. 9d., 10s., San Paulo 6 p.ct. preference 7 7/32, 5 p.ct. debentures 41⅛, South Metropolitan 6¼ p.ct. debenture 104½, Tottenham "A" 122, Wandsworth (Wimbledon stock) 119.

On Thursday, Alliance and Dublin 4 p.ct. debenture 64½ *ex* div., Bournemouth 5 p.ct. 13, 13½, Brentford "A" 113, 115, "B" 113, 115, Cardiff 7½ p.ct. debenture 106 *ex* div., Continental Union 41, European 8½, Gas Light and Coke 97½, 97⅝, 98, 98¼, 98⅜, 3 p.ct. debenture 60, Imperial Continental 178½, 179, 180, Primitiva 10s., 10s. 2¼d., 10s. 3d., 10s. 4½d., 10s. 6d.

On Friday, Cardiff 7½ p.ct. debenture 106⅜ *ex* div., Continental Union 41, 42½, Gas Light and Coke 97⅜, 98, 98⅜, 98½, 4 p.ct. preference 80½, Imperial Continental 179½, 180, Primitiva 10s. 1½d., 10s. 2¼d., 10s. 4½d., 4 p.ct. debentures 78, 78½, 78⅞, 79, South Metropolitan 102½, 6½ p.ct. debenture 104⅜, South Suburban 5 p.ct. 109⅞, 110. Supplementary prices, Southgate 4 p.ct. debenture 75½, Wandsworth 3½ p.ct. new 103⅞, 104.

In Lombard Street the principal matter of discussion was the prospective return to the gold standard, and the pronouncement on the subject by the Chairmen of the five big banks is awaited with keen anticipation. There was a large turnover of funds on Friday, due chiefly to the liability on the 3½ p.ct. Conversion Loan. Treasury Bills were issued at an average rate of £3 14s. 10·33d. p.ct., being slightly under the rate for the previous week. Old day-to-day loans were continued at 2½ to 3 p.ct., with 3½ p.ct. for new money.

In the Foreign Exchange market movements were generally adverse to sterling. The New York rate closed at 4.77½. French francs at 88.55. Belgian francs at 95.30. There was also a reaction in the movement of Italian lire, which closed at 116 7/16 after touching 119½.

Silver was rather a dull market owing to the absence of buyers, and the cash price, after touching 32 7/16d. per oz. at the beginning of the week, finally closed at 32⅜d. per oz.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Jan. 16.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C.	80—83	..	..
235,492	,,	,,	4	4	Do. 4 p.c. Pref.	72—77	..	..
1,551,868	,,	Sept. 25	6	6½	Alliance & Dublin Ord.	64—69	..	65—66
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	61—66*	..	63—64½
300,000	5	Oct. 23	8	8	Bombay, Ltd.	5—5¼	..	5⅜
100,000	10	Aug. 14	8½	8½	Bournemouth 5 p.c.	12½—13½	..	13—13½
425,050	10	,,	7	7	Do. B 7 p.c.	12½—13	..	..
150,000	10	,,	6	6	Do. Pref. 6 p.c.	10⅝—11⅝	..	..
50,000	Stk.	Jan. 8	3	3	Do. 3 p.c. Deb.	56—59*	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	76—79*	..	..
992,045	,,	July 10	6 3/16	6 3/16	Brentford A Con.	112—117	+1	113—115
990,500	,,	,,	6 3/16	6 3/16	Do. B New	112—117	+1	113—115
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	89—94	..	..
306,690	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	75—80	..	..
181,337	,,	,,	—	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Aug. 28	11½	11½	Brighton & Hove Orig.	170—175	..	..
244,200	,,	,,	8½	8½	Do. A Ord.	125—128	..	..
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	95—96*a*	..	..
855,000	,,	Sept. 25	7	8	British Ord.	115—120	..	118
100,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	123—128	..	125
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—77	..	..
100,000	10	Dec. 18	8	6	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref.	6—7	..	6½
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb.	71—76	..	72½
626,860	,,	July 24	6	6	Cardiff Con. Ord.	97—100	..	..
237,860	,,	Jan. 8	7½	7½	Do. 7½ p.c. Red. Deb.	105—108*	+2	106—106½
157,150	,,	Aug. 14	6½	5	Chester 5 p.c. Ord.	91—96*b*	..	..
1,513,280	,,	July 24	6	6	Commercial 4 p.c. Cap.	94—97	..	95¼—95½
560,000	,,	,,	6	6	Do. 3½ p.c. Cap.	94—97	..	95
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	57—60	..	..
800,000	,,	14 Jan. 15	—	—	Continental Union, Ltd.	40—45	..	41—42½
200,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref.	88—92	..	..
660,000	,,	Aug. 28	6½	6½	Croydon sliding scale	102—105	..	..
284,975	,,	,,	5	5	Do. max. div.	84—87	..	..
492,270	,,	Aug. 28	9	6	Derby Con.	107—110*c*	..	..
55,000	,,	Jan. 8	4	4	Do. Deb.	74—76*	..	..
1,002,180	10	July 24	2	6	European, Ltd.	8¼—9½	..	..
16,303,045	Stk.	Aug. 14	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	97—99	+2	96—98⅛
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63—67	+1½	—
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	79—81	..	80½—81
4,761,930	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb.	59—62	..	60—61½
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 11	6½	6½	Hastings & St. L. 5 p.c. Conv.	95—100	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	75—80	..	..
70,000	10	Sept. 25	10	10	Hongkong & China, Ltd.	16—17	..	..
86,600	Stk.	Aug. 14	10	10	Hornsey 7 p.c.	138—143	..	..
1,976,000	,,	Nov. 20	30	10	Imperial Continental Cap.	177—182	+2	177½—180
263,950	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	70—73	..	..
235,242	,,	Aug. 14	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Aug. 14	5½	5½	Liverpool 5 p.c. Ord.	93½—94*b*	..	..
600,000	,,	Sept. 25	7	7	Do. 7 p.c. Red. Pref.	106—109*b*	−1	106
165,736	,,	Aug. 28	8	9	Maidstone 5 p.c. Cap.	125—135	..	..
63,480	,,	Dec. 18	3	3	Do. 3 p.c. Deb.	54—56	..	..
73,000	5	Dec. 4	7	5	Malta & Mediterranean	3¼—3⅝	..	..
341,920	Stk.	Nov. 20	4	4	Montevideo, Ltd.	60—65	..	63½—64
1,875,892	,,	July 24	5½	5	Newcastle & Gateshead Con.	86¼—87½*d*	+2½	87
250,166	,,	,,	4	4	Do. 4 p.c. Pref.	74—75*d*	..	..
329,705	,,	Dec. 18	3½	3½	Do. 3½ p.c. Deb.	68—69*d*	..	..
15,000	10	Aug. 28	11	11	North Middlesex 10 p.c.	16—17	..	..
75,940	10	,,	7 7/16	7 7/16	Do. 7 p.c.	11½—11¾	..	..
300,000	Stk.	Dec. 4	7	9	Oriental, Ltd.	100—105	..	..
138,120	,,	Jan. 8	7⅛	7⅞	Plym'th & Ston'house 5 p.c.	109—114*	..	..
60,000	50	Aug. 28	13	13	Portsea Island B	99—102	..	..
100,000	50	,,	12	12	Do. C	95—100	..	..
2,289,909	1	—	—	—	Primitiva Ord.	9/6—10/6	+−/6	9/3—10/6
311,100	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	76—79	..	78—79
600,000	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	63—65	..	..
220,335	,,	Dec. 18	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
321,670	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref.	7½—7¾	..	7 7/32
125,000	50	Jan. 2	5	5	Do. 5 p.c. Red. Deb.	41—43	+1	41½
270,000	Stk.	Aug. 28	5 8/4	5½	Sheffield A	104—106*c*	..	..
419,968	,,	,,	5 8/4	5½	Do. B	104—106*c*	..	..
1,047,000	,,	,,	5 8/4	5½	Do. C	104—106*c*	..	..
90,000	10	Oct. 23	8	6	South African	7—9	..	..
6,609,895	Stk.	Aug. 14	6½	5	South Met. Ord.	101—103	+1	101—102½
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb.	59—62*	..	..
734,000	,,	Sept. 11	6½	6½	Do. 6½ p.c. Red. Deb.	104—106	..	104½—105
91,500	,,	Aug. 28	8½	8½	South Shields Con.	137—139*d*	..	..
1,087,795	,,	Aug. 14	6½	6½	South Suburban Ord. 5 p.c.	107—112	..	109½—110
368,837	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	94—99	..	..
647,740	,,	Nov. 6	5	5	South'mpt'n Ord. 5 p.c. max.	83—86	..	..
121,275	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	72—77	..	..
250,000	,,	Aug. 28	7	7	Swansea 7 p.c. Red. Pref.	102—104	..	..
200,000	,,	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	102—104	..	103½
120,000	,,	July 24	8	8	Tottenham District A 5 p.c.	119—122	..	122
882,275	,,	,,	6½	6½	Do. B 3½ p.c.	102—105	..	..
181,255	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	75—79	..	..
258,251	,,	Aug. 28	7/14/4	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	84—86*d*	..	..
187,294	,,	Aug. 28	6½	6½	Wandsworth A 5 p.c.	102—107	..	..
68,330	,,	Aug. 28	—	5	Do. 5 p.c. pref.	95—100	..	..
91,800	,,	—	—	—	Do. 5 p.c. Maidenh'd Wandsworth, Wimbledon, and Epsom—	93—98	..	..
30,000	,,	July 10	9½	9½	Wandsworth A 5 p.c.	140—145	..	..
255,636	,,	,,	7½	7½	Do. B 3½ p.c.	120—125	..	..
108,075	,,	,,	6/7/9	6/9/6	Do. C	102—107	..	..
240,865	,,	,,	6/7/9	6/9/6	New Ordinary	..	..	103½—104
352,000	,,	,,	7½	7½	Wimbledon 5 p.ct.	116—121	..	119
98,000	,,	,,	7½	7½	Epsom 5 p.ct.	122—127	..	..
30,416	,,	Dec. 18	3	3	3 p.c. Deb.	57—60	..	..

Quotations at:—*a*,—Bristol, *b*,—Liverpool, *c*,—Nottingham, *d*,—Newcastle, *s*,—Sheffield. * Ex. div.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 19.

Conditions in the London tar products market remain without material change.

Pitch continues quiet, and little business is offering. The price is still called 50s. to 52s. 6d. per ton.

Creosote is still in demand, and for shipment over the next few months the price is firm at 7½d. per gallon net and naked at makers' works.

Pure benzole and pure toluole are steady at about 1s. 10d. to 1s. 11d. per gallon.

Solvent naphtha (95-160) is firm at 1s. 8d. per gallon.

Tar Products in the Provinces.

Jan. 19.

The markets for tar products have been quiet during the past week.

Pitch is decidedly dull. A little business was done at the beginning of last week at 47s. 6d. f.o.b. East Coast ports, since when offers have been made at this figure without success. Continental buyers report having made purchases at the equivalent of 46s. f.o.b.

Creosote is still firm, and some quantity of very fine quality liquid oil is reported to have been sold at 7d. *ex* works.

Benzole is still very firm, and the demand continues.

Solvent naphtha is steady, and there is still a fair amount of inquiry for this article.

Naphthalene and anthracene are still neglected.

Cresylic is quiet, and contracts are difficult to negotiate. There appears to be some demand for carbolic from the Continent, and as much as 1s. 11¼d. casks free f.o.b. is reported to have been paid.

The average values for gas-works products during last week were: Gas-works coal tar, 34s. to 39s. Pitch, East Coast, 45s. to 47s. 6d. f.o.b. West Coast—Manchester, 41s. 6d. to 42s. 6d.; Liverpool, 43s. to 44s.; Clyde, 45s. to 46s. Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8½d.; crude, 65 p.ct. at 120° C., 9½d. to 10½d., naked at makers' works; 50-90 p.ct. naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 7½d. to 1s. 8½d., nominal. Coal-tar crude naphtha in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 6¾d. to 7d.; salty, 6¾d. to 6⅞d.; Scotland, 6⅝d. to 6⅞d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 9d. to 1s. 10d. prompt. Naphthalene, £12 to £14; salts, £4 to £5 10s., bags included. Anthracene, "A" quality, 3d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

The Bradford Corporation Gas Committee propose the allocation of a further sum of £5000 for the purpose of replacing old or laying new gas mains as required.

Coke-Oven Gas at Wombwell.—The whole of the gas supply of Wombwell is now obtained from the coke ovens at Mitchell Main Colliery. The arrangement is proving very successful, both as regards price and quality.

Retford Gas-Works Contracts.—Considerable feeling has been manifested at Retford relative to the action of the Corporation in placing contracts for the major portion of the work of installing, at an originally estimated total cost of £36,000, a new carbonizing plant at the gas-works. The agitation culminated in a meeting under the auspices of the Trade and Labour Council, when the complaint was forthcoming that, while a local firm of gas engineers had sent in a tender for the work amounting to £26,830, the bulk of the contract had been allotted to an outside firm, so that local unemployment was not likely to be relieved. The Chairman (Mr. A. Hollingworth), who was supported by Mr. Tom Williams, M.P., for the Don Valley, contended that it was the duty of the Council to keep work in the town if they could possibly do so; and one wished to know why the Council had dealt with the matter in private, and so prevented the facts from becoming known. Information had been afforded by the Manager of the Retford firm that for the first two contracts they offered to do the work for £18,754, but, despite this, the Council had entrusted the work to a firm outside the town for the sum of £18,850. Ratepayers were entitled to an explanation, and he moved: "That, in view of the dissatisfaction and suspicion caused by the way the contracts for the alteration and extension of the Retford Gas-Works have been allotted, and the uncalled-for secrecy of the Town Council in dealing with the same, this meeting of ratepayers requests the Town Council to give the full facts to the public, or, alternatively, that an independent committee of inquiry be appointed to investigate the whole matter and report thereon." The Chairman added that there was no suggestion involved that either of the firms was not capable of carrying out the work satisfactorily; the local firm possessing a world-wide reputation. The resolution was adopted, but it is not regarded as being likely in any way to affect the attitude of the Corporation, which, it is claimed, has been entirely based upon considerations of public interest.

The Wirksworth Urban District Council are making experiments on the relative merits of gas and electricity for street lighting.

The Thornaby Corporation decided last week that the Stockton Gas Bill should be considered by the Gas Sub-Committee, and that it should be left in the hands of the Mayor and Town Clerk to decide which firm of Parliamentary Agents should be engaged.

The Education Committee of the London County Council have accepted tenders for improving the gas lighting at a number of their schools, by the Gas Light and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, Messrs. W. Sugg & Co., Ltd., and Mr. John Biggs.

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RETORT MOUTHPIECES, HYDRAULIC MAINS, &c.
Apply to the ENGINEER, GAS-WORKS, READING.

DISMANTLED Horizontal Retort BENCH IRONWORK FOR SALE at the Longwood Works of the Huddersfield Corporation, comprising 74 21-in. by 15-in. MOUTHPIECES, 100 5-in. ASCENSION PIPES, 100 ARCH PIPES, 90 DIP PIPES, and 50 BENDS.
Offers for whole or part, f.o.r. Longwood Station, to the Undersigned.
H. SINGLETON,
Engineer and Manager.
Gas-Works,
Huddersfield.

WANTED—Rotary Meter having Capacity of 50-75,000 c.ft. per hour.
Please state Price and full Particulars of same to No. 7514, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

CONTRACTS OPEN.

MARPLE URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

GAS MAINS, PIPES AND SPECIALS.

THE Gas Committee are prepared to receive TENDERS for the Supply and Delivery, f.o.r. Marple Station, of:
3700 yards 6 inch dia. S. & S. GAS MAIN PIPES.
950 " 4 inch dia. " " " ",
with the necessary Syphons, Bends, Tees, and other Specials. All to be fully coated inside and outside with Dr. Angus Smith's Solution.
Sealed Tenders, endorsed "Pipes," to enclose print of Joint Section, stating Weight and Length per Pipe and date of Delivery, to be addressed to the Chairman of the Gas Committee, Council Offices, Marple, near Stockport, and Delivered not later than 2 o'clock p.m. on Monday, the 26th of January, 1925.
JAMES FREEMAN,
Clerk to the Council.
Council Offices,
Marple, near Stockport,
Jan. 14, 1925.

SLOUGH GAS AND COKE COMPANY.

THE Directors of this Company invite TENDERS for SURPLUS TAR (Crude) for One Year. The estimated quantity for sale is 50,000 Gallons.
The Company have a Railway Siding Connecting their Works with the Great Western Railway, and the Grand Junction Canal has a wharf close to the Works. Price to be quoted at the Company's Works.
The Directors do not bind themselves to accept the highest or any Tender.
Tenders to be received not later than the first Post on Tuesday, the 27th of January.
ARTHUR THOMAS,
Secretary.
46A, High Street,
Slough,
Jan. 14, 1925.

BOROUGH OF YEOVIL.

THE Gas Committee of the above Borough are prepared to receive TENDERS of from 1-5000 Tons of COAL over a period of Six Months commencing the 1st of June, 1925.
Tenders, addressed to "The Chairman, Gas Committee, Gas Works, Yeovil," to be received not later than the 24th inst.

STAFFORD CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee are desirous of Selling the AMMONIACAL LIQUOR produced at the Gas-Works, approximating an annual make of 2200 tons of 10-oz. strength.
For further particulars, please apply to the ENGINEER and MANAGER, GAS-WORKS, STAFFORD.

GAS METERS
Their Construction, Use, Fixing, Inspection, and Maintenance.
A Handbook for Engineers and Managers, Inspectors, Fitters, and Students.
By A. T. GILBERT,
Late of the Distribution Staff of the South Metropolitan Gas Company and Distribution Superintendent to the Nuneaton Gas Company.
Price 7/6 plus postage, 6d.
WALTER KING, Ltd., "GAS JOURNAL" Offices, 11, Bolt Court, Fleet Street, E.C. 4.